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JOURNAL

OF THE

American Veterinary Medical Association

FORMERLY AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n.)

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PRESCRIBERS OR PEDDLERS

For some time we have contemplated saying something that may hurt somebody's feelings. We believe the time has arrived. As with most questions, there are at least two sides to the one about to be discussed, and as we have studied the question from several angles, we will present our observations as fairly as possible.

About a year ago a letter was received from one of our members who was highly incensed over the receipt of a letter from one of our well-known pharmaceutical houses and over the signature of a prominent veterinarian. This letter rather tactfully unfolded a scheme for securing "ethical publicity" for the veterinarian and incidentally swelling his income—through the sale of a widely advertised remedy for poultry. Quoting from the letter written us by the member:

"I take it as an insult to have so little respect for the intelligence and dignity of members of our profession to broadcast such letters, having the nerve to request us to be pill peddlers or agents for the remedies of some manufacturer."

Veterinarians in all parts of the country recently received copies of a letter from another prominent manufacturer, offering them a *new* proposition to act as agents for one of the so-called mineral mixtures. The "Vets" (we are quoting from the letter) were offered a comission of 33⅓% on all sales. There was nothing

particularly new about the proposition, however. As a matter of fact it was merely one of a number of quite similar offers made veterinarians during recent years. Leaving aside the plainly patent purpose of the promoters to push a commercial enterprise, these overtures to the profession have undoubtedly been made with a purely honest motive—with the idea of promoting the veterinarian's interests through increasing his income. Even so, this recent letter has served to rouse the ire of some members of the profession.

One member says that it is wrong to think that a reputable veterinarian, one who values his good name among his clients, will stoop from his professional standing to become a salesman of mineral mixtures to his clients. He says that farmers are not fools and that most veterinarians are not fools, and if a veterinarian wants to lose his clients, a quick way to do it would be to make 33⅓% off of them through the sale of a mineral mixture. If our memory serves us correctly, it was some such *profit on anti-hog cholera serum* that resulted in so much agitation for *farmer vaccination*.

Mineral mixtures constitute a fad at the present time—nothing more, nothing less. They are being exploited in the same way that many vitamin preparations were, a few years ago—as panaceas. Unquestionably there are instances of certain mineral deficiencies, in certain localities and in certain feeds raised in these localities. It may be one element here and another some place else. How can any mineral mixture be concocted and safely administered to meet all demands in all places? Intensive studies in nutrition and metabolism have shown that there is a delicate balance to be maintained between mineral elements—calcium and phosphorus, for example. If one is deficient, it alone should be added. It should be *prescribed* by a veterinarian to meet the needs of the individual case. It should not be given with all the other minerals, in the form of a shot-gun mixture, on the say-so of a *peddler*.

Some veterinarians maintain that farmers habitually buy mineral mixtures, stock tonics, and such nostrums, as a part of their regular farm operations. These veterinarians also maintain that they can get this business if they want it, and as long as they can get it they might as well have it. They lose sight of the fact, however, that they are compromising their status as professional men when they engage in such business. Sooner or later, when the bubble bursts, they will find that they

do not enjoy the confidence of their clients, one of the most valuable assets a veterinarian can possess. These clients will mistrust or discount some other entirely honest statement or advice of the veterinarian when they recall the mineral mixture transactions of former years.

We have yet to meet the veterinarian who did not derive a certain amount of pride from the fact that he was a member of a learned profession. We have yet to meet the veterinarian who considered himself any less of a professional man than the physician, the dentist, the lawyer, or the minister. How these same veterinarians can reconcile their professional status, on the one hand, with their purely commercial pursuits—no matter how deeply veiled—on the other, is a question that has not been satisfactorily answered.

MEMBERSHIP DIRECTORY

A copy of the new membership directory has been mailed to every member. Included with the membership list is the Constitution and By-laws with all amendments to date. This is the first time that the Constitution and By-laws has been available in printed form for several years, and we believe that it would be a splendid thing if every member would take the time necessary to read the Constitution and By-laws from beginning to end. It would be particularly appropriate for some of our members to refresh their memories by reading Article 19 of the By-laws. We are not going to say just exactly what is included in the particular article referred to, but it is hoped that your curiosity will be aroused sufficiently for you to get your directory and read this article. The Secretary-Editor would like to have called to his attention any inaccuracies in either the name or the address of any member, as given in the directory, provided, of course, in the case of a change of address, this has not already been reported. If you failed to receive your copy of the directory, kindly notify the Secretary-Editor.

EXECUTIVE BOARD ELECTION

The polls for the election of a member of the Executive Board for District No. 5 were closed May 15, 1925, and the election board, consisting of Dr. E. P. Schaffter, Dr. A. S. Schlingman and the Secretary-Editor, canvassed the ballots and found that Dr. C. H. Stange, of Ames, Iowa, had the highest number of

DR. C. H. STANGE
Member-Elect
A. V. M. A. Executive Board
District Number 5

votes. Dr. Stange was, therefore, declared elected for a term of five years, succeeding Dr. Charles E. Cotton, of St. Paul, Minn., whose term of office will expire with the close of the 1925 meeting in Portland.

Dr. Stange needs no introduction to our members. He recently served the Association as our chief executive, having presided over the largest meeting in the history of the Association, held in Des Moines, last year. He was a member of the first Executive Board created under the present Constitution and By-Laws, having served as the representative from his district from 1916 to 1920. This previous experience on the Executive Board, as well as his recent term as president of the Association, admirably fits Dr. Stange for further service on the administrative body of the Association.

YOUR CORRECT ADDRESS

On April 15, 1925, new postal rates on certain classes of mail matter went into effect. These rates affected the JOURNAL to the extent of increasing the cost of mailing twenty per cent. The greatest increase, however, is in the cost of return postage on copies of the JOURNAL mailed to incorrect addresses. This increase is as large as 300 per cent in some cases. We have frequently asked the cooperation of our members in informing us of any change of address. This is more important now than ever before.

The JOURNAL will not be forwarded from one post office to another unless the necessary postage is provided. We guarantee to pay the return postage, if a copy of the JOUNRAL is undelivered at the address to which it is mailed. We had figured that a copy of the JOURNAL was worth more than the postage required for its return, under the old rates. This may not continue to be the case, however. May we not, therefore, have your cooperation to the extent of notifying this office promptly whenever you change your address. A postal card is all that is required to do this.

MAKE YOUR HOTEL RESERVATIONS EARLY

Word has been received from the Local Committee on Arrangements, at Portland, through Dr. E. E. Chase, that it is very advisable for members who are planning to attend the meeting in Portland to make their hotel reservations at an early date. Portland is very well supplied with first-class hotel accommoda-

tions, but on account of the fact that Portland will be host for an unusually large number of conventions this summer, the hotel accommodations in the Rose City will be taxed to the utmost.

A list of the leading Portland hotels follows, with rates. In writing for reservations, particularly at the Multnomah, which will be the official headquarters, it will be necessary to specify the exact number of days for which accommodations are desired. It is deemed best for members to correspond with the hotel directly, and make their own reservations, but if, for any reason, a member does not desire to do this, Dr. Chase will gladly make the desired reservations. In writing to Dr. Chase, give full information in your first letter.

Portland Hotels

Hotel	European Plan Without Bath One Person	Without Bath Two Persons	With Bath One Person	With Bath Two Persons
Multnomah Official Headquarters	$.....	$3.00–3.50	$.....	$5.00–8.00
Benson Oak and Broadway	2.50–3.00	3.50–4.00	3.50–8.00	5.50–12.00
*Campbell Court Eleventh and Main	.....	.....	2.50–3.50	3.50–4.50
*Campbell Hill 741 Washington St.	1.50 up	2.00 up	2.00 up	3.00 up
Nortonia Eleventh St. off Washington	2.00–3.00	2.50–3.50	2.50–5.00	3.50–6.00
Oregon Stark and Broadway	1.50 up	2.00 up	2.50 up	3.50 up
Portland	4.00	4.00	7.00–8.00	7.00–8.00
Roosevelt West Park and Salmon	.....	.....	2.50–4.00	3.00–5.00
Seward Tenth and Alder	1.50–2.50	2.50–3.00	2.50–3.00	3.50–4.00
Sovereign Sixth and Madison	.....	.....	5.00–8.00	5.00–8.00

*Also American plan.

THE A. V. M. A. SPECIAL

Members planning to go to Portland via the "A. V. M. A. Special" should secure Pullman reservations through Mr. J. R. Van Dyke, General Agent, Burlington Railroad, 175 W. Jackson Blvd., Chicago, Ill. Those who plan to take advantage of the opportunity for a stop-over in the Twin Cities, Saturday morning, will have to leave Chicago Friday evening, July 17, at 6:30 p. m.

Those who do not plan to stop over will not be obliged to leave Chicago until 11 p. m. that evening, on the Oriental Limited.

In writing Mr. Van Dyke, advise on which train Pullman reservations are desired out of Chicago, also what space—lower berth, upper berth, section, compartment or drawing room—for the journey to Portland. The departing time from the Twin Cities will be the same for everybody—those who plan to stop over in St. Paul and Minneapolis as well as those who plan to go straight through. The Oriental Limited will leave St. Paul at 11:25 a. m., and Minneapolis at 12:01 p. m., Saturday, July 18. Regardless of where you intend to join the party on the official train, make your reservations through Mr. Van Dyke.

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APPLICATIONS FOR MEMBERSHIP

(See April, 1925 JOURNAL)

FIRST LISTING

CLEMENS, NELSON E. 183 Castro St., Hayward, Calif.
D. V. M., Washington State College, 1920
Vouchers: Oscar J. Kron and O. A. Longley.

CREELY, ANDREW J. c/o Boise Butcher Co., Boise, Idaho
D. V. M., San Francisco Veterinary College, 1915
Vouchers: F. Gunster and W. A. Sullivan.

DAVIDSON, O. G. 2226 Oakland Drive, Kalamazoo, Mich.
V. S., Ontario Veterinary College, 1907
Vouchers: B. J. Killham and H. Preston Hoskins.

HARDEN, JAMES H. 129 No. 3rd St., Brooklyn, N. Y.
D. V. M., Cornell University, 1923
Vouchers: V. A. Moore and Charles M. Carpenter.

HARTNACK, HUGO Winthrop Chemical Co., 80 Varick St., New York, N. Y.
Veterinarian, Tierärztliche Hochschule, Berlin, Germany.
D. V. M., University of Giessen, 1913.
Vouchers: Henry Amling and Charles W. Shaw.

HINES, GEORGE H. Hume, Ill.
D. V. M., Indiana Veterinary College, 1921
Vouchers: C. C. Donelson and B. H. Saxton.

HUGHES, JAMES WHILDIN Ammendale, Md.
D. V. M., United States College of Veterinary Surgeons, 1918
Vouchers: E. M. Pickens and Robert V. Smith.

HULL, FLOYD E. 1212 Morgan Ave., Downs, Kans.
D. V. M., Kansas State Agricultural College, 1925
Vouchers: E. J. Frick and J. F. Bullard.

MENENDEZ (GUILLOT), FRANCISCO P. O. Box 819, San Juan, P. R.
V. M. D., University of Pennsylvania, 1918
Vouchers: Jaime Bagué and Louis A. Klein.

SAXE, DAVID M. 21 N. Virginia Ave., Atlantic City, N. J.
V. M. D., University of Pennsylvania, 1911
Vouchers: Arthur D. Goldhaft and Louis A. Klein.

SCHMILLE, H. F. Westboro, Mo.
D. V. M., St. Joseph Veterinary College, 1919
Vouchers: E. S. Harrison and Amor C. Drach.

Applications Pending

SECOND LISTING

Andresen, James O., Route 2, Vancouver, Wash.
Avery, Lawrence, 209 Washington St., Frederick, Md.
Canty, John, St. Johnsbury, Vt.
Conlon, Lawrence H., 5 Townsend St., Walton, N. Y.
Harter, Elvie Clark, 415 East 7th St., Portland, Ore.
Hoffman, Ora K., 817 Virginia Ave., Hagerstown, Md.
Korinek, A. W., 203 12th St., Portland, Ore.

ON TO PORTLAND

BIRD'S EYE VIEW OF PROGRAM

	Tuesday 7-21-25	Wednesday 7-22-25	Thursday 7-23-25	Friday 7-24-25	Saturday 7-25-25
MORNING	Opening Session 10 a. m.	Section Meetings 9 a. m.	Section Meetings 9 a. m.	General Business Session 9 a. m.	Trip to Seaside
AFTERNOON	General Business Session 2 p. m.	General Business Session 2 p. m.	Trip up Columbia River Highway 1:30 p. m.	Clinic	
EVENING	Alumni Associations	General Session (papers only)	Banquet	Open	

COMING VETERINARY MEETINGS

New York City, Veterinary Medical Association of. Academy of Medicine, 17 W. 43rd St., New York, N. Y. June 3, 1925. Dr. C. G. Rohrer, Secretary, 40 W. 61st St., New York, N. Y.

Missouri Veterinary Medical Association. Excelsior Springs, Mo. June 8-9-10. 1925. Dr. Fred C. Cater, Secretary, Sedalia, Mo.

Texas State Veterinary Medical Association. College Station, Tex. June 15-16, 1925. Dr. F. S. Palmer, Secretary, 3018 Commerce St., Dallas, Tex.

Texas A. & M. College Short Course for Veterinarians. A. & M. College of Texas, College Station, Tex. June 17-18-19-20, 1925.

Eastern States Tuberculosis Eradication Conference. Providence, R. I. June 16-17, 1925.

Michigan State Veterinary Medical Association. East Lansing, Mich. June 23-24-25, 1925. Dr. E. K. Sales, Secretary, 535 Forest St., East Lansing, Mich.

Massachusetts Veterinary Association. American House, Boston, Mass. June 24, 1925. Dr. H. W. Jakeman, Secretary, 44 Bromfield St., Boston, Mass.

North Carolina State Veterinary Medical Association. Raleigh, N. C. June 24-25. 1925. Dr. W. A. Hornaday, Secretary, Greensboro, N. C.

New York State Veterinary Medical Society. Ithaca, N. Y. June 24-25-26, 1925. Dr. C. E. Hayden, 110 Irving Place, Ithaca, N. Y.

Kentucky Veterinary Medical Association. Glasgow, Ky. July 8-9, 1925. Dr. J. A. Winkler, Secretary, Newport, Ky.

Illinois State Veterinary Medical Association. Peoria, Ill. July 8-9, 1925. Dr. L. A. Merillat, Secretary, 1827 So. Wabash Ave., Chicago, Ill.

Virginia State Veterinary Medical Association. Charlottesville, Va. July 9-10, 1925. Dr. W. H. Ellett, Secretary, Medlothian, Va.

New Jersey, Veterinary Medical Association of. Asbury Park, N. J. July 9-10, 1925. Dr. G. P. Ellice, Secretary, Rutherford, N. J.

Western New York Veterinary Medical Association. Gowanda, N. Y. July, 1925. Dr. F. F. Fehr, Secretary, 243 So. Elmwood Ave., Buffalo, N. Y.

Missouri Valley Veterinary Association. Omaha, Nebr. July 13-14-15, 1925. Dr. E. R. Steel, Secretary, Grundy Center, Iowa.

South Carolina Association of Veterinarians. Greenwood, S. C. July 14-15, 1925. Dr. M. R. Blackstock, Secretary, Spartanburg, S. C.

Minnesota State Veterinary Medical Association. University Farm, St. Paul, Minn. July 15-16, 1925. Dr. C. P. Fitch, Secretary, University Farm, St. Paul, Minn.

North Dakota Veterinary Medical Association. North Dakota Agricultural College, Agricultural College, N. D. July 16-17, 1925. Dr. R. S. Amadon, Secretary, Agricultural College, N. D.

American Veterinary Medical Association. Portland, Ore. July 21-22-23-24, 1925. Dr. H. Preston Hoskins, Secretary, 735 Book Bldg., Detroit, Mich.

STATE BOARD EXAMINATION

Illinois State Board of Veterinary Examiners. State Armory, Springfield, Ill. June 22-23, 1925. Superintendent, Board of Registration, Springfield, Ill.

THE USE OF LIVING SUSPENSIONS OF ALPHA HEMOLYTIC STREPTOCOCCI IN THE CONTROL OF BOVINE MASTITIS*

By C. M. CARPENTER

Diagnostic Laboratory
Department of Pathology and Bacteriology
New York State Veterinary College at Cornell University
Ithaca, N. Y.

It is perhaps needless to emphasize the enormous losses to the dairy industry from mastitis, but at present I consider it, from an economic standpoint, as menacing as tuberculosis or infectious abortion. A survey of this condition in one of our large certified dairies showed that of 151 animals which had died or had been disposed of because of disease or low production, 57 had suffered from mastitis and only ten had recovered from the infection, the udders of the remaining 47 being permanently damaged. The data on this group show that the majority of the cases develop spontaneously, but that the mastitis in a small percentage of cases is secondary to a local injury on the teats. I consider the so-called "spider teat" a primary infection, because a bacteriological examination usually reveals the same type of infection in the milk as is found when the gland shows the inflammation first. The local inflammation, in the majority of cases of "spider teat," spreads up to the gland tissue and a chronic mastitis develops.

In some experimental work on bovine mastitis[1] I found that almost any microorganism, such as a staphylococcus, streptococcus, or one from the colon-aerogenes or pasteurella group, will produce a varying inflammation when introduced into the teat canal. The inflammation which results depends upon the infectious agent introduced, the age of the animal, and the stage of lactation. It was observed that the non-hemolytic type produced a more severe mastitis than the hemolytic type of streptococcus or other bacteria. The streptococci used in this work, and called non-hemolytic, were what Brown[2] describes as alpha hemolytic streptococci. As a rule no hemolysis was observed, but there was always a greenish zone about the colonies

*Presented at the sixty-first annual meeting of the American Veterinary Medical Association, Des Moines, Iowa, August 19-22, 1924.

on blood-agar plates. These plates were not placed in a refrigerator following incubation and this may account for the absence of hemolysis.

Most veterinarians find that mastitis is unsatisfactory to treat and give an unfavorable prognosis. As a rule, however, a veterinarian or laboratory is not called upon until the owner of the animal has tried every remedy for mastitis known to a dairyman. At present a large share of the work in the Ambulatory Clinic of the Veterinary College at Cornell University is devoted to mastitis. The same is true in the Diagnostic Laboratory, large numbers of samples being sent in by veterinarians and by animal owners.

In earlier work, referred to above,[1] some studies were made upon the protection afforded an animal injected with dead suspensions of these streptococci. I found that after gradually increasing doses of these suspensions, injected subcutaneously, over a period of fifteen days, I was still able to produce mastitis in the cows which an attempt had been made to immunize, as well as in the controls, but continued observations showed that some of the controls lost quarters while the injected animals recovered after varying lengths of time. Only 8 animals were used, 4 controls and 4 animals injected with the dead suspensions, so it would be unsafe to draw any definite conclusions, but it would seem that at least some resistance to the infection had been developed.

Later, dead and living suspensions of the alpha hemolytic streptococcus were prepared by the Diagnostic Laboratory and used by the Ambulatory Clinic in the treatment of mastitis. Somewhat favorable results followed, especially in the use of the living suspensions. It was found that the latter could be injected, as a rule, without producing abscesses or other marked unsatisfactory systemic reactions, unless too large amounts were used at the time of the first injection. It was observed, on the other hand, that living suspensions of staphylococci, colon bacilli or *Bacillus pyogenes* produced large local abscesses and only dead suspensions of these organisms could be injected with impunity.

As a result of this work it was decided that the living suspensions of the alpha hemolytic streptococcus were of some value and we suggested to a few veterinarians that they try these living suspensions after their other external and internal drugs had failed to control the infection. In all cases we made autogenous sus-

pensions on a single case, but if there were several animals in one herd and the bacteriological examination indicated the same type of infection, a "herd" autogenous living suspension was made and used.

Because of the expense involved in maintaining large animals for experimental work it is difficult to obtain satisfactory data, but about a year ago an opportunity was offered by which two herds became available. Herd A comprises 151 animals and Grade A milk is produced; herd B comprises approximately 200 animals, certified milk being produced. One hundred seventy-five animals are kept in the certified barn and milked, while the remainder are held in reserve. The number of cases of mastitis occurring in herds A and B for 1922, 1923, and for the first seven months of 1924 are given in table I.

TABLE I—*Distribution of cases of mastitis*

Herd	1922	1923	1924*
A	28	55	13
B	28	57	33

*Seven months only.

During the month of November, 1923, samples of milk and exudates from diseased udders were collected in both herds from each animal suffering with mastitis. A bacteriological examination was made upon the samples and in every case an alpha hemolytic streptococcus was isolated. Staphylococci were sometimes present in varying numbers. The milk varied somewhat in appearance, depending upon the stage of the disease and when the sample was collected. Smears from the samples showed streptococci in short or long chains, mingled with many leucocytes in various stages of degeneration.

Several strains of this streptococcus (alpha type) from each herd were grown on serum-agar for 72 hours at 37°C., washed off with sterile physiological salt solution, and filtered through cotton. This suspension was not heavy enough to make a satisfactory reading with the Gates[3] apparatus, but it was considered a heavy suspension for a streptococcus. On January 8, 1924, 51 cows from herd A were injected subcutaneously with 2 cc of the above living suspension. Forty-three of these animals had never had an attack of mastitis, while 8 had previously suffered from this disease but had recovered. On January 10, a second injection of 5 cc was made and on January 12 there was

given a third injection of 8 cc. The reactions from these injections were very slight for the first two injections of 2 and 5 cc, consisting of only an occasional edematous swelling at the point of injection. The reaction from the 8-cc injection was more severe. Ten of the cows developed subcutaneous abscesses, several of which were incised and washed out with a disinfectant. The remaining 100 cows were kept as controls. The same procedure was carried out on herd B, except that 72 animals were injected with the suspension of streptococci prepared from several strains isolated from cases of mastitis in the herd, and 128 animals were left for controls. The injections were made on January 7, 9, and 11, 1924. In this herd no abscesses developed. A few animals showed a hard, edematous swelling at the point of inoculation, but this subsided in a few days.

An arrangement has been made whereby a sample from each case of mastitis in either herd is sent immediately to the laboratory and a bacteriological examination made to determine the type of infection. The reason for this is that we have found in some herds, where several animals are suffering from mastitis, that certain cases will be due to a streptococcus, but others will show *B. pyogenes* or another type of organism.

The number of cases of mastitis which developed in the cows after the injection of the living suspensions of streptococci, as well as in the control group, are shown in table II.

TABLE II—*Cases of mastitis in injected cows and controls*

HERD	COWS INJECTED	CONTROLS	CASES OF MASTITIS	
			INJECTED GROUP	CONTROL GROUP
A	51	100	5	8
B	72	128	7	26
Totals.....	123	228	12	34

Eight cases of mastitis developed in 100 controls as opposed to 5 cases among 51 injected cows. Of these 5 cases occurring in the injected group, 4 made a complete recovery. One cow developed a slight mastitis, March 24, 1924, from which she lost a quarter. The outcome of the 8 cases of mastitis that developed among the controls was as follows: Each of 4 cows lost one quarter, 2 cows lost the entire udder, 1 recovered, and in one case the results are still questionable.

In herd B the data show that seven cases of mastitis developed in the group of 72 injected cows. Four cases recovered completely, 2 cases were reinjected with the suspensions of streptococci, but the results cannot be determined at present. The other case was in a cow that was normal when she completed her lactation period, but calved with one quarter markedly atrophied. Among the 128 controls 26 cases of mastitis developed in the seven-months period. Of these 10 were injected with the living suspension of streptococci after the mastitis developed and made a complete recovery. Twelve were not injected with the suspensions but treated otherwise. Six of these recovered.

On July 20, 1924, composite samples, including milk from each quarter of each of twenty injected cows and twenty controls in herd A, were collected and cultured to see what percentage of the animals was carrying this particular type of streptococcus in their udders. One-tenth and one one-hundredth cc from each sample was plated on blood-agar and incubated 48 hours at 37°C., after which observations were made on the colonies present. The same work was carried out on 20 cows

TABLE III—*Results of bacteriological examinations of samples of milk from 20 animals injected with living suspensions in herd A and from 20 control animals in same herd*

Injected			Controls		
Cow	Alpha h. s.*	Results of Examination†	Cow	Alpha h. s.*	Results of Examination†
99	—		49	—	
103	+	Few colonies	67	—	
156	—		79	+	44 colonies
186	+	500 colonies	94	+	8 colonies
189	—		95	+	500 colonies
193	—		125	—	
212	—		127	—	
217	+	26 colonies	134	+	Uncountable
221	+	40 colonies	147	—	
237	+	20 colonies	149	—	
427	—		238	—	
521	—		274	+	2 colonies
560	—		277	—	
669	—		280	+	16 colonies
685	+	160 colonies	282	—	
743	+	82 colonies	284	—	
947	—		285	—	
970	+	72 colonies	286	—	
1065	+	28 colonies	287	—	
1091	—		288	+	100 colonies
	+9, —11			+7, —13	

*Presence or absence of alpha hemolytic streptococci in udder, July 20, 1924.
†Number of colonies of alpha hemolytic streptococci in 0.1 cc of milk examined.

which had been injected in herd B as well as on 20 of the controls. The data are shown in tables III and IV.

TABLE IV—*Results of bacteriological examinations of samples of milk from 20 animals injected with living suspensions in herd B and from 20 control animals in same herd*

Injected			Controls		
Cow	Alpha h. s.*	Results of Examination†	Cow	Alpha h. s.*	Results of Examination†
9	+	16 colonies	42	—	
22	+	6 colonies	55	+	2 colonies
53	+	1 colony	162	—	
102	—		163	—	
134	—		166	—	
145	—		194	—	
165	—		214	—	
175	—		234	—	
178	—		246	—	
180	+	Uncountable	254	—	
201	—		260	—	
207	—		261	—	
222	+	1 colony	279	+	27 colonies
233	—		313	—	
239	—		327	—	
240	+	5 colonies	357	—	
244	—		379	—	
258	—		425	—	
267	—		430	—	
318	+	6 colonies	432	—	
	+7, —13			+2, —18	

*Presence or absence of alpha hemolytic streptococci in udder August 18, 1924.
†Number of colonies of alpha hemolytic streptococci in 0.1 cc of milk examined.

The results of these examinations show that 35 per cent and 10 per cent respectively, of the animals in the control groups A and B, carried the alpha hemolytic streptococcus in their udders, while 45 per cent and 35 per cent respectively of the animals injected with the living suspensions were harboring the organisms. It is difficult to draw any very definite conclusions from the above data. In both herds more cows which had been injected with living suspensions of the streptococcus showed them in the udder than controls. In herd A there was not much difference in the two groups while in herd B the difference was more marked, seven of the injected animals being found to harbor this organism, while it was found in the udders of only 2 control animals. There was practically no difference in the number of the alpha hemolytic streptococci present in the udders from each group.

Rogers and Dahlberg,[4] Sherman and Hastings,[5] and later Sherman,[6] showed that about one-third of the cows examined, which were giving normal milk and which had not suffered from

mastitis, carried streptococci in their udders. Evans,[7] Jones,[8] and Ayers and Mudge[9] have made similar observations.

Some work has been done on the injection of autogenous living suspensions of the alpha hemolytic streptococcus on pregnant animals nearing parturition. During the last stages of gestation the udder becomes markedly enlarged and inflamed and great difficulty is often experienced in reducing it to normal. Dr. J. N. Frost, of the Surgery Department, who has charge of the diseases in a large herd of pure-bred animals where enormous udders are the rule, has injected pregnant animals with autogenous dead suspensions of the alpha hemolytic streptococcus followed by injections of the living suspension. No unfavorable reactions have developed from the administration of the streptococcic suspensions in this manner. He reports that the results have been most satisfactory. The pregnant cows which were treated calved with their udders in excellent condition and no purulent inflammation of the glands developed. It was evident that what might be called the "physiological" inflammation of the udder during the late stages of pregnancy decreased. One particular case is very interesting. It is that of a world's champion cow that has a massive udder and that for seven years had suffered from mastitis at the end of gestation. During the last gestation period she was injected subcutaneously with the dead and living suspensions made from the alpha hemolytic streptococcus that she was carrying in her udder. She calved normally and has suffered from no mastitis during the present lactation period.

Four pregnant animals from herd A were injected on January 22, 24 and 26, with 2, 5 and 8 cc of the living suspension. The results are shown in table V.

TABLE V—*Results of injecting pregnant cows with living suspensions*

COW	INJECTED	CALVED	CONDITION OF UDDER AT PARTURITION AND DURING PRESENT LACTATION PERIOD
A 69	January 22, 24 and 26, 1924	1–28–24	Normal
A 78		2–12–24	Normal
A 267		1–29–24	Normal
A 269		2–16–24	Normal at parturition. Developed mastitis 3-9-24. Recovered.

The herdsman reported that the udders were in excellent condition when the cows calved. One of the above animals developed

mastitis 22 days after parturition, but an explanation for this may be the short period of time between the dates of injection and the date of partutition. If the injection affords any protection it must require a certain length of time to become established.

The use of living suspensions of these streptococci in the treatment of mastitis in the two herds is very interesting. The results are shown in table VI.

TABLE VI—*Results of use of streptococci in treatment of mastitis*

	HERD A		HERD B	
	NUMBER	%	NUMBER	%
Cases of mastitis	89		118	
Treated with streptococci	12		28	
Recovered	10	83.3	22	78.6
Not treated with streptococci	77		84	
Recovered	12	15.6	30	35.7

In herd A only 12 out of 77 cases of mastitis had recovered after they had been treated locally with different drugs and hot applications. Many were given formalin internally. The records show that 65 animals (84.4%) lost one or more quarters from the attack of mastitis. Only two out of twelve animals that were injected, either before mastitis developed or after it developed, failed to make a complete recovery. A quarter from one animal became slack while a quarter from the second animal was completely destroyed. The percentage of recovery in this group was 83.3.

In herd B a total of 118 cases of mastitis were recorded for the years 1922, 1923, and to August 1, 1924. Twenty-eight cows were treated with living suspensions of the alpha hemolytic streptococcus after mastitis had developed. Twenty-two (78.6%) made complete recoveries. Four lost quarters. The result in one case is questionable and one cow (477) that had had mastitis ceased giving abnormal milk but her bacterial count remained about 67,500. Therefore she was not a satisfactory animal to be kept in a certified dairy. Of the 84 remaining cases 30 recovered. Forty-eight (57.1%) did not recover. Some of the 30 cows were injected with a polyvalent commercial bacterin, besides being given local treatments, but I was unable to get the exact number. The termination in six cases is questionable.

Either the records are not complete or else the disease is so recent the final outcome can not be stated.

Discussion

Judging from these data the injection of living suspensions of alpha hemolytic streptococci seems to afford a cow some protection from mastitis, but many unknown factors have to be considered. In the first place, there is doubt among certain workers whether it is possible to produce an immunity with streptococci. There is much clinical evidence to show that an attack of a disease due to a streptococcus confers little or no immunity. This is especially true of the alpha hemolytic streptococcus which produces mastitis. The history of most of the cows in these herds usually reveals two or three, or six or seven, attacks of the disease with a final destruction of one or more quarters of the udder. Secondly, it is not known how long it takes to produce an immunity, or how much of a certain suspension is required to protect a cow, could we be certain that the organism does afford the animal resistance to the infection. These are unknown factors which it will take a long time to work out. It is interesting to note that of the 12 cases of mastitis which developed in the 123 treated animals, nearly all occurred in the first or second month following the injections of the streptococci. This may indicate that a period of 30 or 60 days is required to develop an immunity which will be great enough to protect the cows from the invasion of the streptococci and the resulting infection.

In our laboratory the last year we have prepared 12,290 cc of dead and living autogenous suspensions of streptococci, isolated from samples of mastitis milk. These have been used by veterinarians for the control of bovine mastitis. They report very favorably upon the results obtained from their injection. Some prefer suspensions of the dead organism while in other instances the injections are started with dead suspensions and then followed with living cultures. Although the injections of the dead streptococci are of apparent value, unquestionably better results from the use of the living suspensions of this organism have been obtained. They shorten the course of the disease and check the resulting inflammation so that fewer tissue changes take place. We have in the past received many reports of the efficacy of these suspensions in treating mastitis, but the results recorded in this work are the first experimental data in which there were control animals to check the work.

As regards the use of living suspensions of the alpha hemolytic streptococcus in the treatment of mastitis in herds A and B, there is much evidence of their value. Of the 40 cases treated with the autogenous suspensions only six (15%) failed to make complete recovery. Of the animals which suffered from mastitis and which had never been injected with the living cultures, 57.1% in herd B and 84.4% in herd A failed to recover.

We feel that the living suspensions of the organism in question can be injected with impunity, if the suspension is that of a pure culture of an alpha hemolytic streptococcus, and not too large amounts are given at a single injection. It is necessary, of course, to observe antiseptic methods in injecting the cultures. In herd A some abscesses developed but we attribute these to factors other than the suspension used for the injection. In a herd of 25 cows, all of which were injected with the living suspensions, three animals developed a marked edema on the neck and shoulders. These three animals were cows that, just previous to the administration of the living culture, had suffered from clinical cases of mastitis. They suffered from a systemic reaction and were stiff on their front legs for two days, but they recovered in a short time.

In treating cases of mastitis with this method the injections are continued until the udder shows evidence of improvement. Many different systems for the amounts to be given and dates of injection have been used by veterinarians to suit their own convenience, and because of this no definite plan of procedure can be given at this time. It seems safe to inject subcutaneously one or two cc of a heavy living suspension of an alpha hemolytic streptococcus and to double the amount in two or three days. This amount may be doubled again for the third injection which can be made on the fifth or sixth day, or at a greater interval. One veterinarian has injected, with no bad results, each of 400 cows with 5, 10 and 15 cc of the living suspension, given 3 to 4 days apart. There seems to be no advantage in using greater amounts than 15 cc of the suspension at a single injection. This may be due to the increased work placed upon the tissues in the process of absorbing such a great quantity. There must be a limiting point where the benefits derived from the injection of a biological therapeutic agent are overcome by the extra work thrown on the tissues in attempting to assimilate and to use it advantageously to protect themselves. As a rule the treated animals recovered in from four to twelve

days after the first injection of the living suspension, two to four injections having been given in this period of time. It may be argued that if these streptococci produce mastitis when injected into the udder, there is a possibility of their producing mastitis when injected subcutem, should they have a specific affinity for the mammary gland. There is some evidence to prove that the artificial cultivation of these organisms attenuates them. I found in some studies on the production of mastitis,[1] that infected milk apparently produces a more severe mastitis than a culture of the organism isolated from the milk. The injection of the cultures under the skin undoubtedly modifies their pathogenicity. In this work we feel that its success depends upon the autogenicity of the suspensions injected.

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DISCUSSION

DR. ORR: I would like to ask Dr. Carpenter if this autogenous bacterin or vaccine, that was prepared for use in cases of mastitis, was a mixed bacterin or whether it was a straight hemolytic strain. Do you isolate your organism?

DR. CARPENTER: In each case, we have always used a pure culture of the alpha hemolytic type. We plate our samples on blood-agar as soon as they come in. You have to be careful, for if you have a few staphylococci in the suspension you are apt to have an abscess formation from injecting these live suspensions. In one herd, where they started out by injecting eight cubic centimeters of the suspension, some abscesses developed. I did not inject them myself, and it may have been due to contamination from the syringe or something like that, but I think the success of this depends upon the autogenicity of the suspension and the purity as well.

DR. ORR: I would like to ask one more question. In the use of bacterin first and the vaccine following, how many doses of each do you use?

DR. CARPENTER: That varies. I start in perhaps with one cubic centimeter of the living suspension. Many men have used this while others have different methods of injecting. In some cases, they may start out with two or four cc of the dead suspension, then inject the living following that. No definite method has been devised for injecting them.

DR. J. F. SHIGLEY: I would like to know if there is any bacterial count made of the suspension; second, whether or not, following any of these injections, there were any systemic reactions; third, in connection with each case injected at the time of the mastitis, how long until complete recovery occurred?

DR. CARPENTER: No counts have been made of the streptococcic suspensions. We have tried to standardize the suspension with the Gates apparatus but it was so dilute it was impossible to do that. The other question was concerning the systemic reaction. In one herd, of about twenty-five animals, there were three cows in which I do not believe there was any elevation of temperature, but there was a marked swelling on the necks of these animals. They recovered of their own accord. They were stiff on their front legs for two or three days, but they recovered.

In regard to the matter of complete recovery, that varies. I have not good data on a very large number of cases. I have not done all of the work myself.

They usually inject the suspension until the conditions clear up. They may make three or four injections, three or four days apart, or two or three days apart, for a moderate length of time, until the condition does clear up.

DR. FITCH: I would like to ask Dr. Carpenter if he believes we are yet justified in naming this streptococcus and not calling it the alpha or hemolytic type. It seems to me the terminology in general use for streptococci is somewhat faulty. I am wondering if we are yet justified in assigning a definite name to this streptococcus.

DR. CARPENTER: From my own standpoint, I think we are justified in calling this alpha hemolytic type *Streptococcus mastitis* if any type is given this name.

DR. FITCH: Can you distinguish between the alpha hemolytic type isolated from the uterus of the cow and that isolated from the udder?

DR. CARPENTER: At present Dr. Gilman is doing a lot of work on these organisms. The organisms are similar in their reaction on blood, but their reactions on the carbohydrates are different. I have not the information on this, but I think Dr. Gilman has some information which would show that the organisms from the genital tract are quite similar to the streptococci from the udder.

DR. FITCH: Are they exactly similar?

DR. CAPRENTER: I can not say definitely.

DR. MCELROY: I would like to ask Dr. Carpenter, in regard to these curative effects that he has received, is there any definite type or kind of mastitis?

DR. CARPENTER: I do not know that I understand your question, but I believe you want to know if all the different types of mastitis showed the same type of infection?

DR. MCELROY: No, I wish to know if you received the same results from treating all kinds of mastitis; for example, there are some kinds that affect the mucous membrane. There is a difference in the rapidity in which they develop. I was wondering if you received the same curative effects in all cases.

DR. CARPENTER: My experience is that the different types of mastitis one sees depend upon the stage at which you make your observation. The inflammation may start out with a spider teat, that is, with a little chronic inflammation at the end of the teat or up from the end of the teat. In some cases you get a hardening of the quarter with no thick milk. The etiology of the inflammation is similar in the majority of cases but the character of the mastitis milk is different, depending on the time when the milk is drawn and the observations are made. You have one specific type of inflammation starting out and you may have a chronic case develop from that. You do have, in some cases, with the staphylococcus infection, an acute condition, which clears up but where you have the chronic inflammation the udder is not so liable to make a complete recovery. I do not think you can classifiy it that way. I think one type of inflammation follows another. It depends upon your animal and the type of infection.

DR. BIRCH: I want to add a word in regard to the question Dr. Fitch brought up. I can't give all the details, because they are not fresh in my mind. Dr. Gilman isolated a streptococcus of the alpha type in pure culture from the fetal membrane of an aborting cow and several organs of the fetus also contained the organism in pure culture. We took a saline suspension of the streptococcus and put it into the teat canal of three or four cows that had calves. All of these cows developed severe mastitis in the quarter affected, and each, I think, lost the quarter.

We had a calf that was nursing one of these cows. This calf, in going to and from the box-stall, had the habit of stopping and taking a little milk from another cow which he was not supposed to suck. He always reached in from behind to take this milk from the two hind quarters, and those two hind quarters developed severe mastitis.

I think Dr. Gilman makes the statement that the two are of different types, that is, he has not usually found streptococci isolated from the genital tract and those isolated from the udder to be similar, but in this case there is a very

definite history. We can not place too much dependence on teat canal inoculations, for as Dr. Carpenter said, almost anything is conclusive in the teat canal. This was a severe mastitis contracted by natural infection which destroyed the quarter. It was due to a streptococcus that came from the fetus and membranes of an aborting cow in a pure culture.

DR. FITCH: I do now wish to add materially to this discussion. The point I wish to make, however, is this: I have worked with streptococci coming from mares, the results of which were published this year. So far as I could tell, I could not differentiate them from certain streptococci isolated from cattle.

I think you will remember that last year there was presented to this Association a paper on a streptococcus isolated from mares, which was given a very definite name. I, for one, can not see that we have reached the point where we can pick out a streptococcus from a group which is so closely related and say one is a; another b, another c.

DR. CARPENTER: I think Dr. Fitch is speaking of cultures on which Dr. Dimock is working. I received some of these cultures. The cultures I received were the beta type and were entirely different from the mastitis cultures with which I have worked.

LOST

Below is given a list of members of our Association for whom we have no correct addresses. First-class mail, sent to these members at the addresses given after their names, has been returned by the post office, undelivered. The Secretary will be very glad if any of our members can furnish correct addresses for any of these men.

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THE BACTERIAL CONTENT OF MILK OR INFLAMMATORY EXUDATES FROM BOVINE MASTITIS

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Much work has been done in the past on the bacterial flora of normal, freshly drawn milk and also on milk from diseased udders, especially on the group of streptococci which are ubiquitous in dairy work. These bacteria have become important to the sanitarian because, only until comparatively recently have bacteriologists been able to differentiate the various types of streptococci common to men and to domestic animals. Samples of milk or other inflammatory exudates from infected udders contain uncountable numbers of bacteria, but in many instances the changes in the macroscopic appearance of the milk are so slight the milker fails to detect them, and it passes unnoticed as normal milk. This infected milk, if due to streptococci, rarely, if ever, produces any disease in the human family, although in a few instances, milk-borne epidemics of tonsilitis have been described. Unquestionably, from an economic standpoint, a cow with an infected udder in a dairy can do great harm by transmitting mastitis to the other animals in the herd.

Inasmuch as there was abundant material coming to the laboratory, it was decided to find what percentage of the samples was due to streptococci, as well as to other types of micro-organisms. It has been our observation that samples of milk from inflamed udders, shipped to the laboratory under all kinds of atmospheric conditions and temperatures, without being packed in ice, are seldom altered in character from the time they were collected. On the other hand, samples of normal milk, that is, milk which appeared normal from a macroscopic standpoint and did not contain large numbers of leucocytes, invariably became acid and coagulated unless it was well iced during shipment. Either the altered character of the milk was such that it was no longer susceptible to souring, or else the

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infective agent or the substances produced by its development inhibited the growth of those bacteria which produce lactic acid.

Bacteriological examinations were made on 150 samples of abnormal milk and inflammatory exudates from infected udders. As soon as the sample was received, it was plated on blood-agar and smears were made on glass slides and Gram-stained. Because it had been observed that from 10 to 25, or perhaps a larger, per cent of dairy cattle in an infected herd, carry *Bacterium abortum* in their udders, the question arose as to whether it was present in an inflamed udder. The hypothesis has been suggested by a few men investigating infectious abortion of cattle due to the Bang organism, that *Bacterium abortum* is the primary cause of the condition and paves the way for the streptococci and other bacteria which may be isolated as secondary factors. Therefore, guinea pigs were injected with various amounts of the samples to see what percentage contained *Bacterium abortum*. These would also show evidence of tuberculosis should the samples contain tubercle bacilli

The bacteriological examinations made on the 150 samples mentioned above gave the following results: alpha hemolytic streptococcus, 118; beta hemolytic streptococcus, 10; *Bacillus pyogenes*, 6; *Staphylococcus aureus*, 6; *Staphylococcus albus*, 3; unidentified Gram-negative rod, 2; colon bacilli, 3; mixed—alpha hemolytic streptococcus and *Staphylococcus aureus*, 1; negative, 1. From these data one finds that 78.6 per cent of the samples are infected with the alpha hemolytic streptococcus. These samples were collected from 76 different herds in New York, Massachusetts, and Pennsylvania, the majority coming from New York State. We feel that this shows the widespread distribution of this type of infection.

Seventy-seven of the 150 samples were injected intra-peritoneally into guinea pigs (see table). The samples injected in 61 cases were infected with alpha hemolytic streptococci, in 4 samples with beta hemolytic streptococci, in 4 with *Bacillus pyogenes*, in 3 with *Bacillus coli*, and 2 samples each with *Staphylococcus aureus* and *Staphylococcus albus*. One sample showed a mixed infection with an alpha hemolytic streptococcus and a *Staphylococcus aureus*.

It is amazing to see how well the guinea pigs stood the injection of these heavily infected inflammatory products. Many of the samples were nothing but a purulent exudate from the udder. Of the pigs that were injected with samples infected

TABLE I—*The results of injecting mastitis milk into guinea pigs*

Guinea Pig Number	Accession Number	Result of Bacteriological Examination	Result of Guinea Pig Injection	Remarks
2479	9346–102	Alpha h. s.*	Negative	
2480	9331	*Bacillus coli*	Negative	
2481	9323–386	Alpha h. s.	Negative	
2482	9323–407	Alpha h. s.	Negative	
2489	9450	Alpha h. s.	Negative	
2490	9458	Alpha h. s. and *Staph. aureus*	Negative	
2491	9464	Alpha h. s.	Negative	
2492	9329	*Staph. albus*	Negative	
2493	9323–454B	Alpha h. s.	Negative	
2495	9323–545B	Alpha h. s.	Negative	
2496	9323–407B	Alpha h. s.	Negative	
2503	9478	Alpha h. s.	Negative	
2504	9471B	Alpha h. s.	Negative	
2505	9471A	Alpha h. s.	Negative	
2516	9502–239	Alpha h. s.	Negative	
2517	9502–261	Alpha h. s.	Negative	
2518	9502–443	Alpha h. s.	Negative	
2519	9502–1014	Alpha h. s.	Negative	
2524	9502–1068	Alpha h. s.	Negative	
2535	9524	*Bacillus coli*	Negative	
2536	9520	Alpha h. s.	Negative	
2538	9527–523M	Alpha h. s.	Negative	
2539	9527–524M	Alpha h. s.	Negative	
2567	9532	*B. pyogenes*	Died, 1 day	Fibrinous peritonitis. *B. pyogenes* isolated.
2568	9535	Alpha h. s.		Infected with *Bact. abortum.*
2580	9532	*B. pyogenes*	Died, 9 days	Pneumonia and fibrinous peritonitis. *B. pyogenes* isolated.
2581	9557–539	Alpha h. s.	Negative	
2583	9557–538	Alpha h. s.	Negative	
2586	9552–1	Alpha h. s.	Negative	
2587	9552–2	Alpha h. s.	Negative	
2588	9552–3	Alpha h. s.	Negative	
2589	9556–262	Alpha h. s.	Died, 24days	Pneumonia. Beta h. s. isolated from tissues.
2598	9588A	Alpha h. s.	Negative	
2609	9588B	Alpha h. s.		Infected with *Bact. abortum*
2610	9586	Alpha h. s.	Died, 12days	Pneumonia. Beta h. s. isolated from tissues.
2642	9600	Alpha h. s.	Negative	
2643	9586	Alpha h. s.	Negative	Milk bloody.
2645	9552–2	Alpha h. s.	Negative	
2646	9532	*B. pyogenes*	Negative	
2647	9557–540B	Alpha h. s.	Negative	
2648	9557–540A	Alpha h. s.	Negative	
2649	9556–262	Alpha h. s.	Negative	
2650	9546–743	Alpha h. s.	Negative	
2665	9613–1147	Alpha h. s.	Negative	
2677	9625	Alpha h. s.	Negative	
2687	9613–54	Alpha h. s.	Negative	
2697	9650–164	Alpha h. s.	Negative	
2719	9649–1	*Staph. aureus*	Negative	
2720	9649–2	*Staph. aureus*	Negative	
2721	9630	Alpha h. s.	Negative	
2799	9668–3	Beta h. s.	Negative	
2804	9747	Alpha h. s.	Negative	Milk bloody.
2805	9700	Alpha h. s.	Negative	
2806	9546–743	Alpha h. s.	Negative	
2807	9690	Alpha h. s.	Negative	
2808	9625	Alpha h. s.	Negative	
2810	9615	*B. pyogenes*	Negative	
2833	9774–204	Alpha h. s.	Negative	
2835	9751–2	Alpha h. s.	Negative	
2836	9751–1	Beta h. s.	Negative	
2842	9728–493	Alpha h. s.	Negative	
2843	9773D	Alpha h. s.	Negative	
2844	9773C	*B. pyogenes*	Negative	
2845	9773B	Alpha h. s.	Negative	
2846	9773A	Alpha h. s.	Negative	
2859	9785	Alpha h. s.	Negative	
2860	9721	*Staph. albus*	Negative	
2861	9748	Beta h. s.	Died, 10days	Fibrinous peritonitis. Beta h. s. isolated.
2868	9666–1	Beta h. s.		Infected with *Bact. abortum.*
2869	9791	Alpha h. s.	Negative	
2877	9794D	Alpha h. s.	Negative	
2878	9794C	Alpha h. s.	Negative	
2879	9794A	Alpha h. s.	Negative	
2880	9794B	Alpha h. s.	Negative	
2885	9808–1	Alpha h. s.	Negative	
2886	9808–2	Alpha h. s.	Negative	
2887	9811–11	Alpha h. s.	Negative	
2896	9834–42	*B. pyogenes*	Negative	
2897	9685–132	Alpha h. s	Negative	

*h. s. indicates hemolytic streptococcus.

with alpha hemolytic streptococci, only two died, and these died from a pneumonia which was causing us some trouble during the coldest weather. These results show that this type of streptococcus is non-virulent for guinea pigs when injected into the peritoneal cavity. One of the four guinea pigs injected with samples infected with beta hemolytic streptococci died from a fibrinous peritonitis, from which this organism was recovered in pure culture on postmortem. The guinea pigs injected with samples infected with *B. coli* and staphylococci apparently suffered no ill effects.

The four specimens from which *Bacillus pyogenes* was isolated proved virulent in only one case. On January 24, 1.0 cc of sample 9532 was injected intraperitoneally into guinea pig 2567, which died in 24 hours with a severe fibrinous peritonitis, from which the organism was recovered in pure culture. On February 4, 1.0 cc of the same sample was injected in the same manner into guinea pig 2580. This pig died from a pneumonia and peritonitis on February 13, 9 days later. *Bacillus pyogenes* was recovered in pure culture from the lungs and fibrinous exudate. On February 29, a third guinea pig, 2646, was injected with 1.0 cc from the same sample, 9532. This injection apparently had no ill effect on the pig. It remained well until April 14, when it was destroyed. On postmortem it was found normal.

These results show that *Bacillus pyogenes* in exudates from infected udders, when injected intraperitoneally, has comparatively low virulence for guinea pigs. Apparently the organism in the milk became less virulent on standing in the refrigerator, as evidenced by the results obtained from the injection of the same sample three different times. This may be due to the variation in the resistance of the pigs, but they were practically of uniform size.

The remaining pigs were destroyed by illuminating gas from 6 to 8 weeks after the injection. They were then posted and observations made upon the presence or absence of any lesions. Occasionally there were a few adhesions around the spleen. A sample of blood was collected for an agglutination test with a *Bacterium abortum* antigen, and cultures were made on serum-agar from the spleen and liver, and occasionally from the epididymes.

Three guinea pigs, 2568, 2609, and 2868, were found infected with *Bacterium abortum*. The samples with which the two former were injected gave cultures of the alpha type of streptococcus,

while the sample with which the latter was injected showed a beta hemolytic streptococcus. *Bacterium abortum* was not recovered in culture from any of the above samples. This would indicate a small number of organisms in the sample.

The guinea pigs showed typical lesions of the disease. Their blood serum showed a titre of 1-960, and *Bacterium abortum* was isolated in pure culture from the spleens and livers. These results show that 3.89 per cent of the samples contained *Bacterium abortum*. That infectious abortion, due to the Bang organism, is present in many of the dairy herds from which the majority of the specimens came is without question. An agglutination test on the blood serum from many of the animals showed a high titre. The percentage of samples from inflamed udders showing *Bacterium abortum* is lower by far than the percentage of the same number of normal samples of milk that will show this organism.

Not a single pig showed any evidence of tuberculosis. The layman often thinks that mastitis milk is due to tuberculosis. In our examinations, however, we have found that samples of milk containing tubercle bacilli usually show no marked macroscopic changes. Upon microscopical examination, there are, as a rule, very few leucocytes present.

In this work, it was interesting to note the macroscopic appearance of the different specimens received. It was thought for a time that it was possible to tell from the appearance of the sample what type of infection was producing the disease, but after a few observations this was found to be impossible. Alpha hemolytic streptococci were isolated from the majority of the samples. These specimens varied in appearance from normal milk to a straw-colored or reddish serum, containing a few or many flocculi of the coagulated fibrin and pus cells. In some of the cases, there was practically no serum, but chiefly a thick, stringy mass of pus cells and fibrin with a fetid odor. The specimens from the udders infected with *Bacillus pyogenes* were usually altered to such an extent they did not appear like milk but were only inflammatory exudates. These could not be differentiated, however, from exudates collected from a chronic case of mammitis from which streptococci were isolated. The same is practically true of the samples from which staphylococci and other miscellaneous types of infection have been recovered.

The appearance of the sample depends largely upon the time it is collected during the course of the disease. That the course

of the mastitis depends upon the type of infection producing it was brought out in an earlier communication.[1] The inflammatory exudate is continually changing in character, and the resulting inflammation by which it is usually classified does not remain the same through the course of the disease. This depends upon the resistance of the animal and the virulence of the infection producing the mammitis. It is also possible to have two types of inflammation present at the same time, such as a purulent and a parenchymatous mastitis.

Discussion and Summary

In these studies on the types of infection associated with mastitis in cattle, I have considered the alpha hemolytic type of streptococcus as described by Brown[2] to be the same as the non-hemolytic streptococcus with which Jones[3] has worked. Jones found 34.5 per cent of his cases studied to be associated with the non-hemolytic type, while in our work we recovered the alpha hemolytic streptococcus from 78.6 per cent of the specimens examined.

The guinea pig injections show that the streptococci and other miscellaneous types of organisms associated with mastitis are practically non-virulent for these animals. Only three samples showed evidence of *Bacterium abortum*. This percentage (3.89) is much lower than other observers have found in samples of normal milk from dairy herds. None of the guinea pigs showed evidence of tuberculosis.

It seems evident from these studies that the alpha hemolytic type, or non-hemolytic type, as Jones has termed it, is responsible for the majority of losses caused by mastitis. Jones states: "Mastitis caused by infections with non-hemolytic streptococci is more prevalent than that caused by other classes of micro-organisms. Data point to the extreme severity of these infections. Of the thirteen animals under observation for a considerable period but four recovered." He states that much of the material with which he worked came from a single large dairy herd where mastitis was prevalent.

Ayers and Mudge[4] have studied the streptococci of the bovine udders from 54 cows in 2 herds, and state that they "feel that these streptococci represent the 'majority streptococcus flora.' There are apparently two varieties, hemolytic and non-hemolytic, which may be termed beta and gamma varieties." They also

state: "They may be grouped and called *Streptococcus mastitidis* (Guillebeau)."

It seems unwise to us to place two organisms, with such a marked difference in their hemolytic action on blood, under the one specific name of *Streptococcus mastitidis*. Jones and Ayers and Mudge found beta hemolytic streptococci in many of the samples which they examined. In our work we found 6.6 per cent of the samples to contain beta hemolytic streptococci. We feel, inasmuch as practically 80 per cent of our samples from 76 different herds have shown the alpha hemolytic streptococcus, that if any organism should be so named, it should be the streptococcus described by Jones as the non-hemolytic type, described by Ayers and Mudge as the gamma type and by Brown[2] as an alpha hemolytic streptococcus.

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TEN MILLION CATTLE UNDER TEST

The nation-wide drive to stamp out bovine tuberculosis now includes veterinary supervision of more than ten million cattle. A report just issued by the United States Department of Agriculture on the status of the work shows the following progress up to the first of April.

Cattle under supervision	10,201,492
Cattle in herds successfully passing the first test	6,777,624
Cattle in fully accredited herds	1,187,908
Cattle tested during the last month (March, 1925)	617,810
Cattle reacting to the test during month	19,841
Cattle on waiting list to be tested	3,498,072
Modified accredited counties, recognized as tuberculosis-free	69

Reports from various parts of the country show unusual interest in tuberculosis eradication on a county-wide basis. In the first three months of the year the number of "modified accredited" counties, those having less than one-half of one per cent of the disease, increased from 53 to 69. Veterinary officials of the Bureau of Animal Industry consider that such progress is ample proof of the practicability eventually of freeing entire states from the disease. North Carolina already has 30 counties, officially recognized as free from bovine tuberculosis.

Eradication of the disease from cattle is the first step in removing the menace of tuberculosis to hogs and poultry. The suppression of infection among live stock aids likewise in the control of human tuberculosis.

ON THE ORIGIN AND SIGNIFICANCE OF SOME PATHOLOGICAL PROCESSES OF THE BOVINE UTERUS*

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There are three essential points to which I wish to confine my discussion of this subject, namely: first, the influence the development of the fetal placenta appears to have on the susceptibility of the maternal placenta and uterine mucosa to infections; second, the alterations of the placenta due to infection and their probable effect on the function of the placenta; and third, the application of the facts discussed in one and two to the control of infections of the pregnant and puerperal uterus.

The maternal placenta, with its crypts and niches that receive the chorionic villi, is a structure that develops subsequent to conception. There is no evidence of the crypt in the region of the placenta in the mucosa of the non-pregnant uterus (fig. 1). In the development of the fetal placenta, the chorionic villi grow out as buds from the chorionic epithelium toward the maternal placental areas and ultimately implant themselves in the developing placental crypt. The growing villus apparently irritates the uterine tissue and coincident with the growth of the villus the uterine mucosa grows up around the villus, thus forming the uterine crypt. Apparently, as a rule, but not always, the uterine epithelium is eroded by the epithelium of the chorionic bud. Later this is repaired and the crypt becomes lined with epithelium (figs. 2 and 3). The development of chorionic villi is a continuous process throughout the period of pregnancy. New chorionic buds may be seen developing at any stage of pregnancy. In all the stages of pregnancy that we have studied we have had no difficulty in observing this erosion of the maternal epithelium.

The numerous breaks in the continuity of the maternal epithelium obviously would favor the invasion of the maternal tissues by pathogenic bacteria that were present in the uterochorionic cavity. To us this phenomenon appears to be a most significant factor in infections of the maternal placenta. It also appears within the realm of possibility that the great activity of the maternal placenta in defending itself against the invasion of

*Presented at the sixty-first annual meeting of the American Veterinary Medical Association, Des Moines, Iowa, August 19-22, 1924.

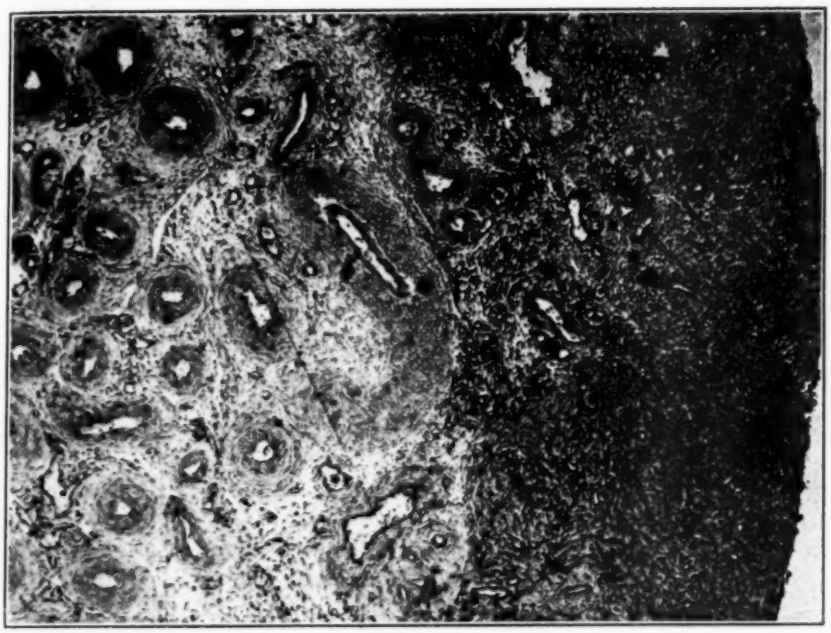

FIG. 1—Placental area (cotyledon) of uterine mucosa of normal non-pregnant uterus. Note the numerous blood-vessels and absence of crypts. (Magnification x 65.)

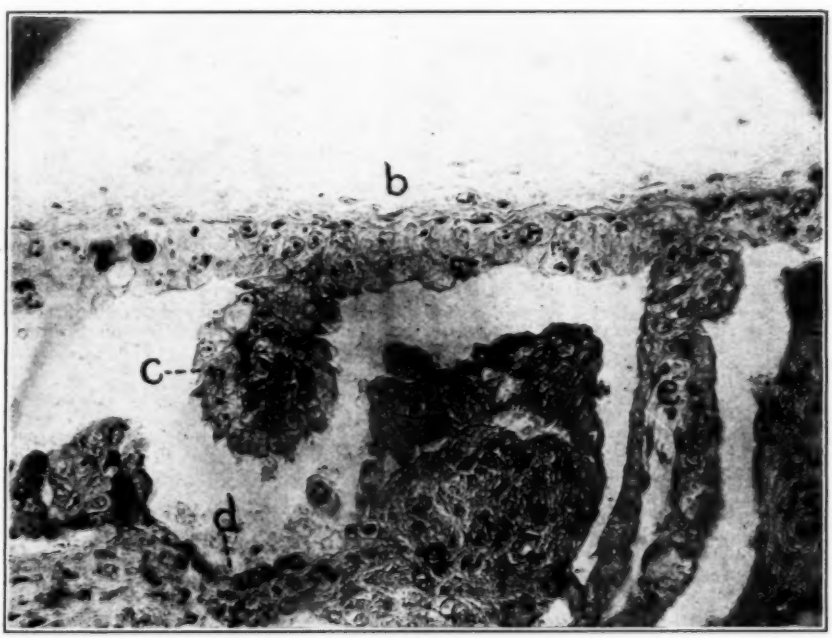

FIG. 2. Section from peripheral portion of placenta. Normal pregnancy of five months duration. Maternal placenta, a; chorion, b; chorionic bud, c; and erosion of maternal epithelium d. A longer villus (e) is seen in the cut. The chorion was pushed slightly back in the process of preparation. (Magnification x 250.)

the chorionic villi might render its being less able to defend itself against invading bacteria.

In studying sections of the pregnant uterus we also observe, in some cases, attachment of the interplacental portion of the chorion to the interplacental portion of the uterine mucosa. Here we observe the same process as seen in the placental areas with the same erosion of the maternal epithelium (fig. 4).

If we concede that the numerous breaks in the continuity of the maternal epithelium favor the invasion of the maternal tissues by bacteria from the utero-chorionic cavity, what is the

FIG. 3. Section from peripheral portion of placenta. Normal pregnancy of five months duration. Young chorionic villus, a. Note the spreading of the maternal epithelium (b) over the wall of the crypt. (Magnification x 290.)

explanation of the occurrence of bacteria in the utero-chorionic cavity? It appears that there are several sources from which this cavity may become invaded by bacteria. They may be present in the uterus, as in cervicitis, endometritis or salpingitis, at the time of service. They may be transmitted to the uterine cavity through the secretions of the bull. They may invade the cavity from a diseased cervix that has become diseased subsequent to service. They may reach the cavity through the blood and lymph.

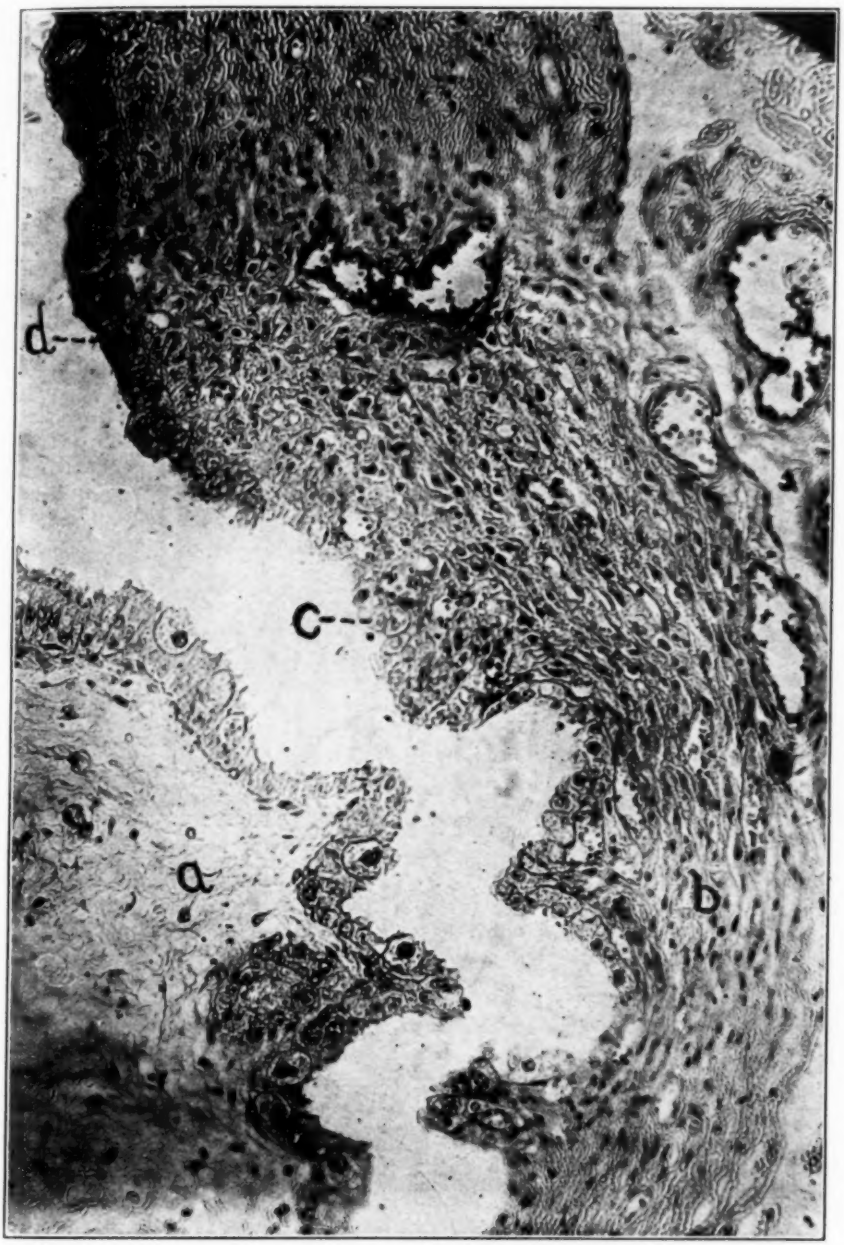

FIG. 4. The early stage of attachment of the interplacental portion of the chorion (a) to the interplacental portion of the uterine mucosa (b). Duration of pregnancy three and one-half months. Note the change in the character of the maternal epithelium, at c, from the normal epithelium, at d. (Magnification x 195.)

FIG. 5. Section from peripheral portion of placenta in pure abortion bacillus infection (case 366-A). There is a superficial necrosis of the placenta (a) with leucocytic infiltration and some proliferation of the connective tissue cells of the sub-necrotic zone (b). Abortion exudate (c) is seen between the placenta and overlying chorion. There is degeneration and necrosis of the chorionic epithelium (d) but otherwise little change in the chorion (e). (Magnification x 70.)

FIG. 6. The same alterations as seen in fig. 5, with leucocytic infiltration of the overlying chorion (a). In no sections studied from this case (366-A) were more extensive alterations of the chorion observed than shown in this cut, and this condition of the chorion was exceptional. The usual condition was as seen in figure 5. (Magnification x 70.)

What are the results from an invasion of the maternal placenta by pathogenic bacteria? Our studies indicate that either of two conditions may occur: One is an acute, superficial, necrotic inflammation of the placenta (fig. 5). As a continuation of this, the overlying chorion (fig. 6) and the uterine mucosa lying under the placenta (fig. 7) may become involved.

It is significant that, primarily, this acute, necrotic inflammation appears to arise in the region where the greatest erosion of maternal epithelium occurs.

Associated with this condition, we have observed a more limited, superficial, necrotic inflammation of the interplacental

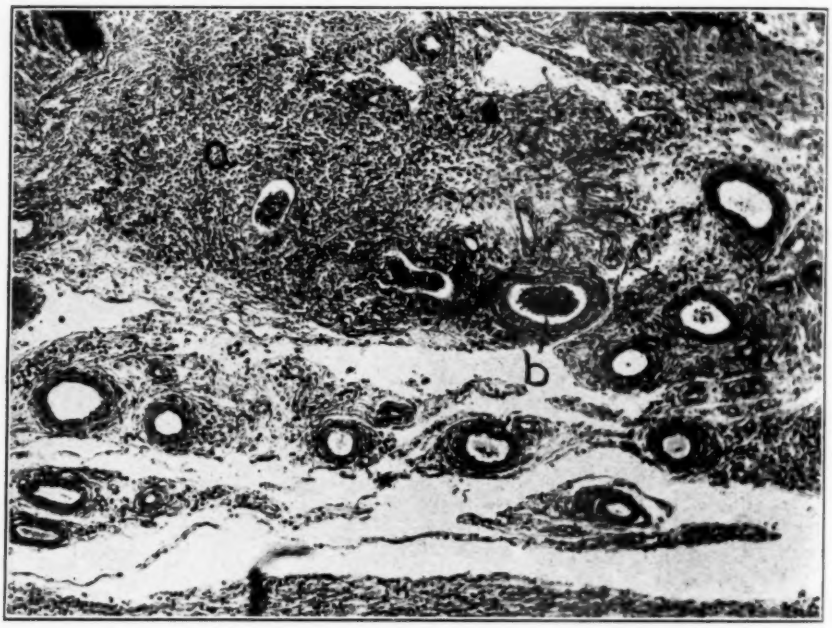

FIG. 7. Periglandular leucocytic infiltration (a) of the stroma of the uterine mucosa underlying the cotyledon (case 366-A). A cellular exudate is seen in some of the tubules (b). (Magnification x 65.)

portion of the uterine mucosa with round-cell infiltration of the underlying stroma (fig. 8). We interpret this latter condition as secondary to the process described as occurring in the placenta and believe its development is favored by the erosion of the maternal epithelium due to the efforts of the chorion to attach itself at this point.

The other condition that may result from invasion of the maternal placenta by pathogenic bacteria is a more chronic, productive inflammation of the maternal placenta with degenera-

tive and atrophic changes in the fetal placenta (figs. 9 and 10). We interpret the degenerative changes in the fetal placenta as due largely to the effect of the chronic, productive inflammation of the maternal placenta on the nutrition of the fetal placenta. Obviously, fibrotic thickening of the walls of the crypts influences the capillary circulation through them and unfavorably influences the nutrition of the chorionic villi, causing atrophic and degenerative changes in them.

It appears reasonable that the most obvious general effect of either an acute, superficial, necrotic inflammation of the placenta

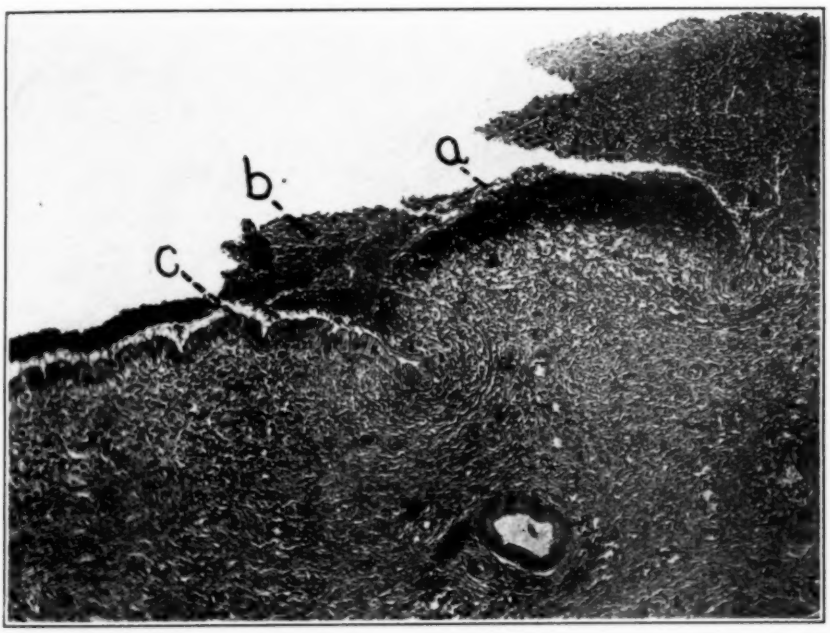

FIG. 8. Superficial necrosis (a), interplacental portion of uterine mucosa, in pure abortion bacillus infection. Some abortion exudate is seen adherent to the surface (b). At the left the epithelium (c) is intact and alive. (Magnification x 70.)

or a chronic, productive inflammation of the maternal placenta is the lowering of the efficiency of the placenta as a structure to transmit nutritive material from the maternal blood to the fetal blood and to transmit the excretory products of the fetus from the fetal blood to the maternal blood. If this be true, obviously the fate of the fetus will be determined by the extent of the alterations of the placenta and these in turn will depend upon the virulence of the invading bacteria and the resistance of the tissues. It is reasonable to assume that a certain amount of placental alterations could be compensated for by increasing

the amount of placental structures, and we interpret the attachment of the chorion to the uterine mucosa in the interplacental areas as compensatory.

It appears to us that the lowered efficiency of the placenta, due to causes already discussed, indicates the fundamental nature of abortion disease. More extensive alterations of the uterine tissues, the fetal membranes and the fetus are but manifestations of a more extensive invasion of all the structures involved by the invading bacteria.

Either the acute, necrotic inflammation of the placenta or the chronic, productive inflammation may cause retention of the

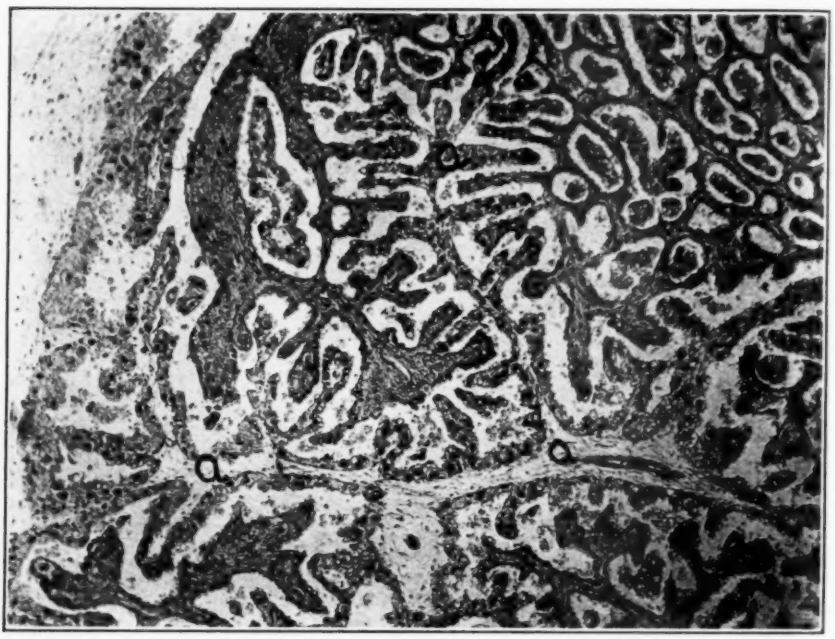

FIG. 9. Outer portion of placenta. Normal pregnancy of five months duration. Note the primary and secondary branches of the large villus (a). Wall has estimated that there are about ten of these larger villi per square centimeter of surface area of the cotyledon in the seventh to ninth months of pregnancy. These villi reach a depth of several centimeters. This gives one an idea of the extensive and complicated attachment of the chorion to the uterine mucosa. (Magnification x 60.)

fetal membranes, regardless of the fate of the fetus. In either case, the thickening of the wall of the crypt more firmly holds the chorionic villi and prevents their release subsequent to the termination of pregnancy.

The softening of the placenta through liquefaction necrosis eventually permits the fetal membranes to slip away.

Reference has already been made to the erosion of the maternal epithelium in the interplacental portion of the uterine mucosa,

apparently the result of efforts of the chorion to attach itself in this region. It appears that this affords channels of infection of the uterine mucosa by bacteria in the utero-chorionic cavity that might otherwise not be able to gain a foothold in the uterine mucosa. In a previous article,[1] we have reported the finding of bacteria in the deeper portions of the uterine mucosa in cases of chronic, catarrhal endometritis. It appears that bacteria localiz-

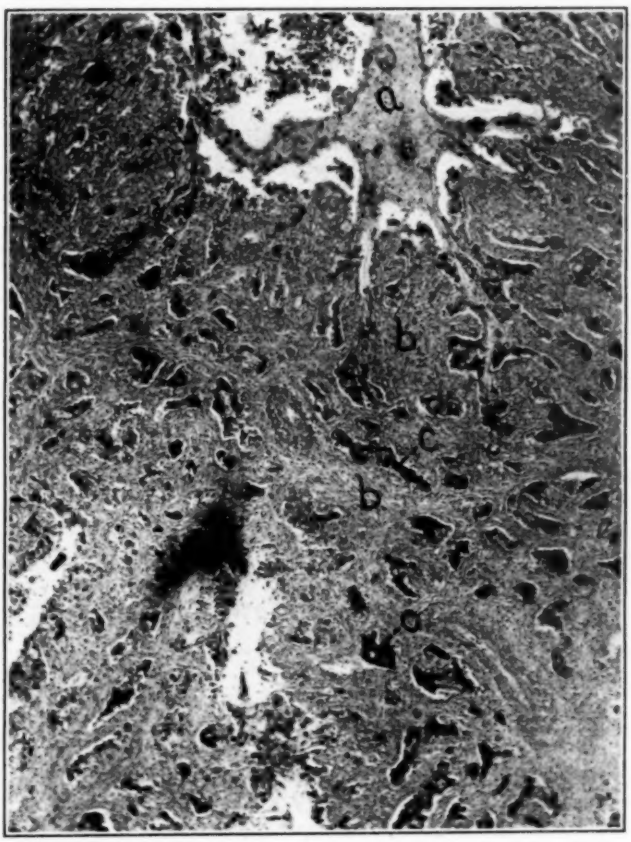

FIG. 10. Section from placenta of abortion bacillus infected cow, aborting at eight and one-half months, followed by retention of the fetal membranes. Several cotyledons with chorion attached were removed through cervical canal about thirty-six hours after abortion. At a, is seen a large chorionic villus holding the chorion in contact with the maternal placenta. In this case we have marked fibrosis of the maternal placenta (b), instead of the acute necrotic inflammatory condition seen in some of the other cases. The chorionic villi (c) are in a state of necrosis. (Magnification x 60.)

ing in the deeper portions of the uterine mucosa may persist for variable lengths of time and influence the results of breeding sebsequent to the termination of the existing pregnancy.

For these reasons we believe that the erosion of the maternal

[1]JOURNAL, A. V. M. A., lviii (1920), n. s. 11 (1), p. 8.

epithelium of the interplacental portion of the uterine mucosa is of great significance in infections of the uterus that influence the function of the reproductive organs subsequent to the termination of the pregnancy in which the invasion occurred.

The frequency with which puerperal endometritis occurs is well known by all cattle practitioners. Undoubtedly, in many cases this condition is the result of an infection, established in the uterus prior to the termination of pregnancy, that has been exacerbated as the result of the favorable conditions for infection provided by the process of involution. In other cases, it is no

FIG. 11. Maternal placenta with fetal placenta attached. Normal pregnancy of five months duration. Note connective tissue band (a) at base of placenta. (Magnification x 6.)

doubt due to an infection introduced into the uterus at the time of or subsequent to parturition. What are the conditions that favor the invasion of the uterine tissues at this time? Our studies indicate that the process by which the maternal placenta (cotyledon) is eliminated, or reduced, is the answer to this question. Our studies indicate that the maternal placenta is eliminated by a process of liquefaction necrosis and erosion (figs. 11, 12 and 13). This not only provides a great amount of necrotic and disintegrating tissue for the development of putrefaction bacteria particularly, but results in the erosion of the uterine mucosa at

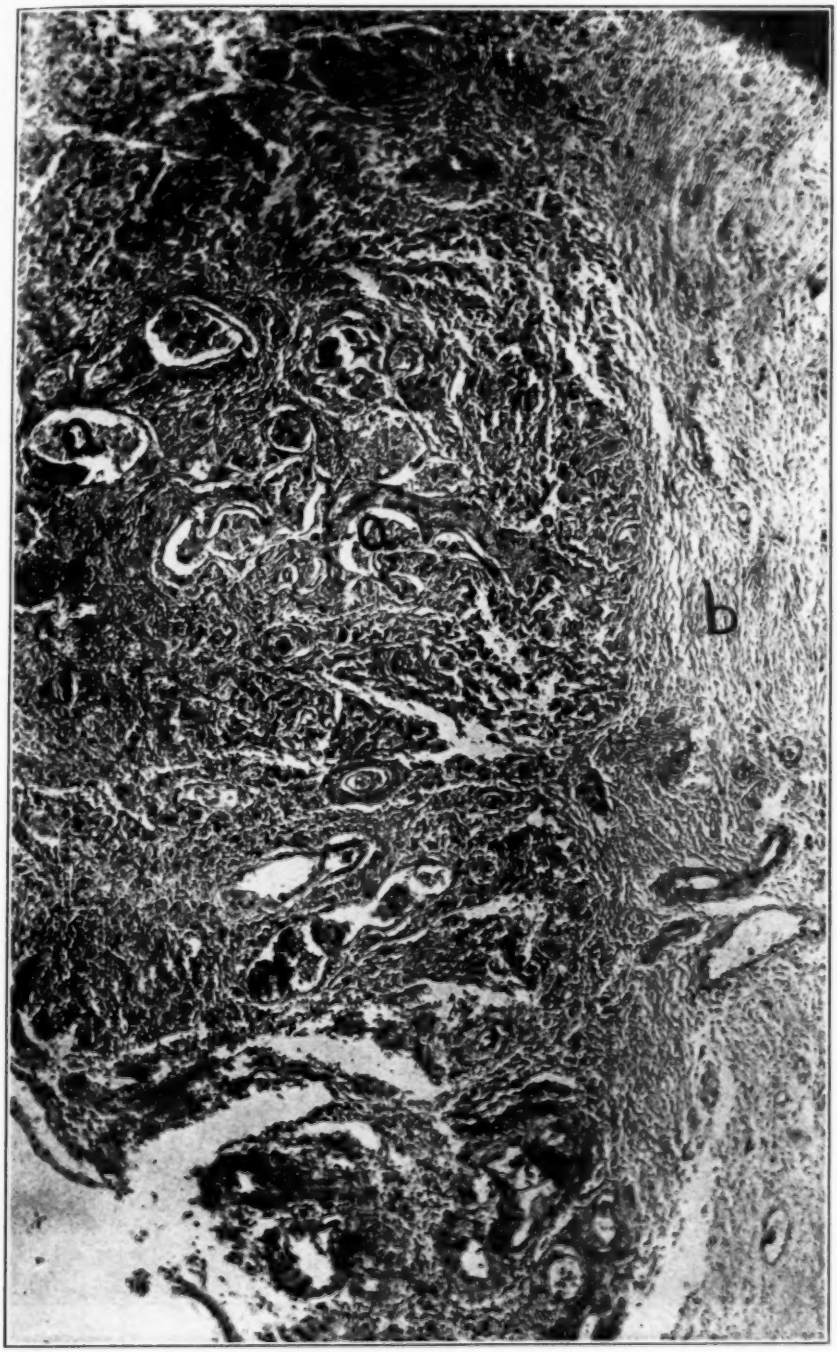

FIG. 12. Section from cotyledon on the fifth day after normal parturition. In the placental portion one recognizes some of the larger crypts with degenerated and necrotic epithelium. In some of the crypts (a) the necrotic remains of the chorionic villus is seen. The placental portion is a mass of degenerated and necrobiotic tissue, infiltrated with leucocytes and undergoing liquefaction. At b, is the connective tissue base in the earlier stage of hyalin degeneration. (Magnification x 60.)

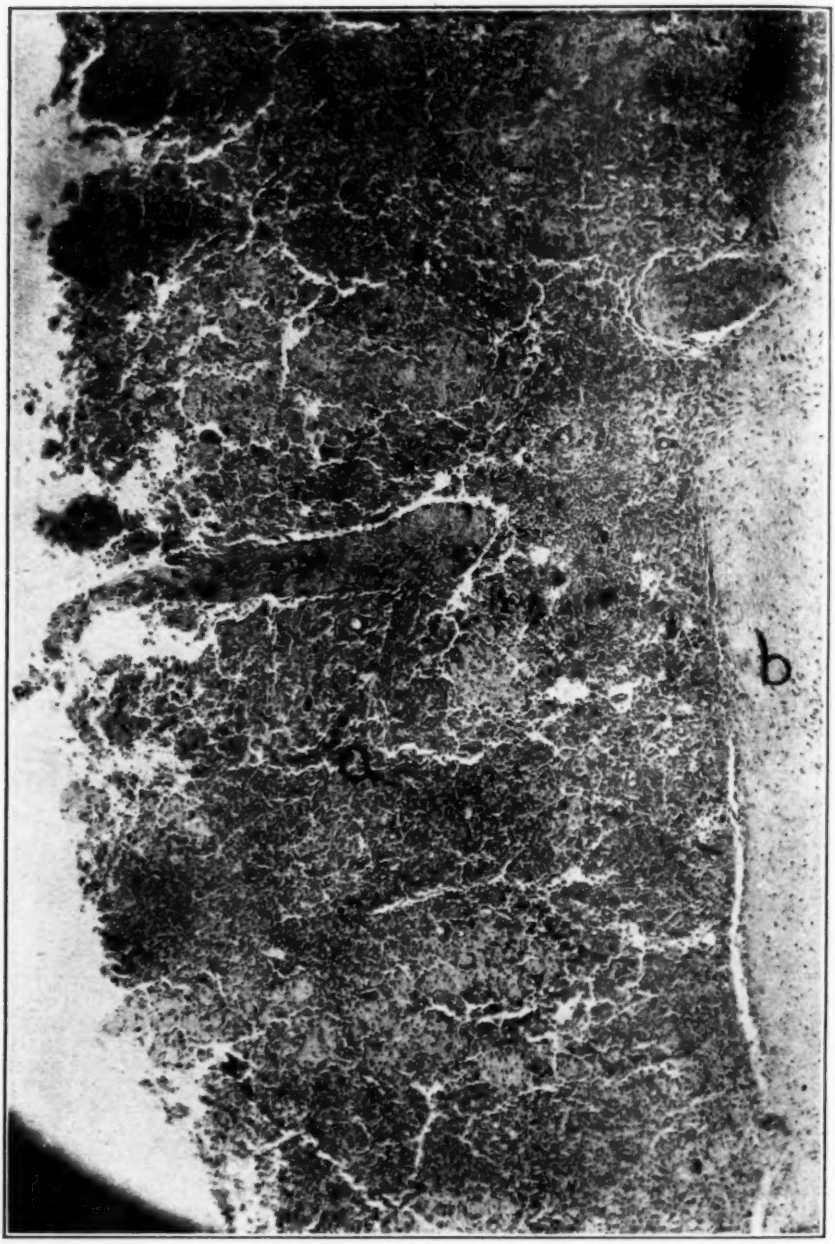

FIG. 13. Section from cotyledon on the tenth day after normal parturition. The crypts are no longer recognizable in the placental portion (a). Numerous leucocytes are seen in the degenerated and necrobiotic placenta. There is a more marked hyalin degeneration of the underlying base (b). (Magnification x 65.)

the site of the cotyledon which remains denuded until the contiguous epithelium grows out over the area. Obviously such a condition would favor a more extensive invasion of the tissues by an infection already established in the tissues or one introduced into the uterine cavity at the time of or subsequent to parturition.

We now come to the third and last point we wish to discuss. If we have made the proper interpretation of the origin and significance of the alterations of the placenta in infections, what measures do they suggest in the control of such infections? It appears to us that they suggest at least three fundamentals that are essential in the control of these infections. First, the mating of individuals with healthy reproductive organs. If there is already an infection of the cervix, endometrium or oviduct, or if infection is introduced with the discharges from the bull, the changes in the uterine mucosa due to the development of the placenta appear to favor a more extensive invasion of the tissues by such infection.

Second, the inauguration of a system of herd management that assures the maintenance of the herd in a high state of health in order that resistance to infection may be high. This is of great importance since there are no practical measures that will entirely eliminate exposure to infection, both from without and to infection existent in some other region of the body.

Third, the inauguration of a system of herd management that minimizes the exposure of the individual to infection from other individuals.

Reference has already been made to the process by which the maternal placenta is eliminated subsequent to the termination of pregnancy and its relation to puerperal infections. With this process in mind, the thought is suggested that the most effective treatment of the puerperal infections must provide for effective drainage, the lessening of putrefaction of the disintegrating maternal placenta and inhibit absorption of the products of the disintegrating products of the maternal placenta and bacteria.

ACKNOWLEDGMENT

For the use of the cuts used in illustrating this article, we are indebted to Dr. D. H. Udall, Editor of the *Cornell Veterinarian*.

The New Oriental Limited
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OUR PRESENT KNOWLEDGE OF THE PHENOMENA OF OESTRUS IN DOMESTIC ANIMALS

The Factors Concerned in their Production, with their Relation to Sterility. Fourth Paper.*

By H. S. MURPHEY, G. W. MCNUTT, B. A. ZUPP AND W. A. AITKEN

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For some time we have been making an extensive, detailed study of the oestrous cycle in domestic animals, the methods and results in part having been published. During the past year our attention has been concentrated particularly on the phenomena found on rectal palpation and the factors causing and regulating the cycle. We have been led into the fields of genetics, nutrition, metabolism, and endocrinology, and are not yet ready to eliminate the nervous system as a controlling mechanism. We have been led to believe that heredity, nutrition, and hormones from the genitalia and other known endocrine glands, probably through metabolic regulation, are important factors in sterility as well as infection and its sequelae.

The literature on sex anatomy and physiology is so extensive that it can scarcely be mastered by any one person or associated group. The bibliographies already published by two of us are made more complete in this article, yet we have not exhausted the literature.

The newer facts of chemistry, of nutrition, of controlled animal experiments, particularly the facts brought out by the work of the physiological anatomists, have given us better methods to study the phenomena relating to reproduction in mammals. Our postulate is not new, but should be stated as follows: Reproduction in the female demands normal organs in normal effeminate individuals, developed in average time, on the proper feed, in favorable hygienic surroundings, with the proper amount of exercise for the species and, of course, successful mating to healthy vigorous males.

Three fundamental, important biological characteristics of living matter are:

1. Nutrition—the changing of dissimilar to similar material with the utilization of the resultant energy.

*Presented at the sixty-first annual meeting of the American Veterinary Medical Association, Des Moines, Iowa, August 19-22, 1924.

2. Irritability—ability to respond to environmental influences, food, etc.
3. Reproduction.

We believe that there is an optimum state of nutrition necessary.[24] The classical flushing of sheep in England is well known, and we have some data showing a similar increased fecundity in the pig from heavy feeding of a balanced ration preceding and during the breeding season. There is also plenty of evidence to show the ill effect of undernutrition. It has remained, however, for Evans and Bishop,[1] with their exact knowledge of oestrous phenomena, to give us a clear analysis of the effects of diet. However, Dr. Nelson[2] and some of his colleagues at Ames do not agree with the former in regard to "factor x," although it has previously been stated in the literature by several workers that certain substances must be already stored in the body for successful conception and reproduction.

Bemis[3] has already pointed out the necessity of studying and, when necessary, changing the feed in handling sterile herds.

"A metabolic disorder—adiposity—often leads to cessation of ovarian function." We already have histologic proof that in adiposity there is an upset in the tubular part of the genitalia also (Es. Cy. 36).

Professor Isaacson, a veterinarian and nutrition expert of Norway, told one of the writers (H. S. M.) that nutritional sterility certainly occurs in cattle, and suggested that the European nutritive rations were better than ours. He believes our grain-feeding too heavy and our inorganic salt balance and protein also at fault. He pointed out that their fish-meal took care of the latter. Evans and Bishop and others have shown: (a) that quality of protein is as essential as quantity (inadequacy of wheat protein has been shown by McCollum and others); (b) that salt deficiency slows up growth and the incidence of oestrus; (c) that lack of vitamin A affects the tubular cycle; (d) that lack of vitamin B stops ovarian function; (e) that lack of fat is deleterious; (f) that lack of "factor x" causes a placental disease. In other words, all of the known food materials must be present in adequate amounts and available form. Parenthetically, we believe this problem too large for state experimentation and that the Bureau of Animal Industry should plan and execute experiments, of several years' duration, to clear up this matter in cattle. Practitioners, sterility workers, and others

should publish all observations throwing any light on this phase of sterility.

Corner[19] and his pupils have given a very clear account of the peristaltic movements of the tubular part of the genitalia in relation to the oestrous cycle and early pregnancy in the pig.

We referred last year to an evolutionary factor, deAberle[29] has since proved a hereditary intra-uterine defect in mice.

It is believed that an endocrine [4,5,6,7,25,26] balance is necessary. What that is no one knows. It has been suggested that "thyroid instability" is one of the causes of ovarian disease.[4] It is also known that the hypophysis is at fault in some human genital upsets—particularly in a condition of adiposity with infantilism, especially in males. We have studied a few clinical cases of chronic sterility in the cow that we believe are due to thyroid or hypophyseal insufficiency or possibly both. We are now applying some experimental glandular therapy in selected cases, in conjunction with the clinic staff.

Sajous[7] believes "adrenal rests" responsible for all the cyclic and reproductive phenomena.

Loeb[8] has attributed certain hormones to the corpus luteum of heat. One of his greatest contributions is undoubtedly his clear elucidation of the complexity of the interaction of the various factors concerned. *A propos* of his conclusions, we have been unable to phase the oestrous cycle (see case reports 55) by intravenous injection of watery corpus luteum extract, even in enormous doses.[19] Last year, we pointed out, in part, the complex cyclic changes of the oestrous cycle in the ovary[9,27] and tubular part of the genitalia.[10,27] We have continued our studies on the ox, pig,[27] dog, and horse, and have found a typical cycle in all, similar to that reported for the ox. It is impossible, in the time allotted, to discuss in any detail our additional findings or to review similar work done on the cow by Hammond,[23] of Cambridge, England, except to state that we are fully convinced of and are now engaged in proving, experimentally, the interdependence of the ovary and the tubular part of the genitalia[19,28] in the ox.

With only an anatomical basis and a time correlation,[15] we thought possibly the follicular fluid, very little of the chemistry and physiology of which is known, had something to do with the onset of heat and the anatomical changes of oestrus. We therefore collected ovaries from healthy, open cattle, aspirated aseptically the liquor folliculi from all follicles above ten mm.,

diluted it with three or four volumes of physiological salt solution, then filtered it through asbestos wool, and finally through a Berkefeld filter into sterile tubes. One dose has been the equivalent of one ovary, given on the eighteenth or nineteenth day of the cycle, so as to increase the vascular and secretory phenomena. We believe that some hormone body from the uterus would then bring on the next ovarian cycle, since it has been frequently observed that the ovaries fail to function during disease of the tubular part[21,28] of the genitalia. We believe that these two parts of the genitalia are functionally dependent on each other, but *how* is not clear.

Historical

In 1907, Sonnenburg,[11] a German veterinarian, experimented with liquor folliculi. His conclusions were in part that "the liquor folliculi contains the substance which brings about heat." Adler[12] used watery extracts in virgin animals to produce uterine changes simulating heat (1912). Aschner,[13] in 1913, used both ovarian and placental extracts successfully. Frank,[14] 1917-1922, used follicular fluid. Robinson,[15] on purely morphological grounds, stated in 1917 that "the phenomena of pro-oestrum and oestrus appear only when a group of follicles has attained a stage of development which may be called preinseminal maturity, and the phenomena are due to some secretion produced by the follicles in that phase of their development." It remained for Allen and Doisy[16] to isolate an "ovarian hormone" in 1923 and demonstrate its specificity. (As noted, we have used only crude and *homologous* material.) Seaborn and Ch. Champy,[17] using liquor folliculi from the mare, have produced rut in the rabbit. Courrier[18] used liquor folliculi from the sow to produce heat in spayed guinea pigs.

We propose the term *oestrual hormone* for this substance of the liquor folliculi which produces some, at least, of the anatomical changes and secretory phenomena of heat.

We were unable to produce external manifestation of heat in spayed bitches (bitch 2) by injecting liquor folliculi from the ox, but we did get an oestrual flows imulating heat. We were, however, able to produce the typical congestion, edema, and secretion of heat (pro-oestrum, oestrus, and post- or met-oestrum) in a spayed cow. (See case reports.)

A marked case of pyometra (no. 64) was under observation of the clinical staff and one of us (B. A. Z.) for several months. No

oestrus appeared. The case was then turned over to us for experimental purposes, and an intravenous injection of six doses brought on an oestrous cycle with extreme uterine hemorrhage, followed by another oestrous cycle, follicular development, rupture, and a small corpus lutuem. During this time a marked improvement of the tonus of the uterus resulted, with no recurrence for four weeks. Later injections produced only mild heat reactions. (See case reports.)

In order to try out, practically, this *oestrual hormone* and to demonstrate fully the interrelationship of the tubular genitalia and ovary, we have under treatment and observation, in conjunction with the clinical staff of Iowa State College, cases of the following selected types of sterility:

1. Hopeless cases of chronic pyometra.
2. Heifers, never in heat.
3. Heifers, regular, but non-breeders.
4. Heifers, irregular, but non-breeders.

(Organs normal when examined with glass speculum and by rectal palpation.)

5. Sterile cows, in classes 2, 3, and 4.
6. Senile cows.

When sufficient cases have been studied to make the data valuable, it will be published. In the meantime, we hope others will use the same method in selected cases. *We believe this form of therapy will give some results, but we hope before this material is commercialized that there will be enough data to justify its use.*

In the mare, cow, and pig we have an oestrual flow, but not menstruation. The latter phenomenon is known to be peculiar to the primates[5,19,20] and to represent an abortion-like process of the maternal placenta or of the unfertilized egg and to occur about midway between two ovulations, which occur 13 days after the onset of menstruation (Snyder) and in no way comparable with oestrus, as supposed by Heape[24] and since recapitulated and positively stated by many others.

Case Reports

Oestrous Cycle, Cow 55: Cow brought in from the Veterinary Farm on 3-14-24. At that time, care-taker reported that she had had only one calf, and that about a year ago, not bred since, but had been in heat regularly. Genitalia normal in every respect and passed through normal cycles. In heat

March 15, injected daily with 5 cc corpus luteum extract* until 5-19-24. In heat, April 5, April 25, May 16, June 6, June 27. Killed, July 17. (No. 55, 20½ day oes., cy. ox.) Genitalia normal for this stage of cycle.

Oestrous Cycle, Bitch 2: Bitch used for vestibular smears, February 1 to July 5, spayed April 4. Injected on May 8, with ½ dose of oestrual hormone; on June 3, with the liquor folliculi of a follicle taken from the ovary of a three-months pregnant cow; on June 12, with liquor from two follicles taken from a bitch ovary (not in heat, but approaching).

No gross changes were observed from any of these injections, but the oestrual flow gave a secretion simulating that found during heat (bitch 1).

Oestrous Cycle, Cow 54: Aged Jersey cow. Had a calf about a year before purchased. Came into heat regularly, bred several times, but would not conceive. Animal was examined and the genitalia seemed to be in good condition. Had a normal color, although the cervix was slightly enlarged and appeared as though it had been lacerated, but did not show any inflammation. Tract felt normal per rectum, uterus was mostly abdominal but of normal size, and presented a good tone. The ovaries, however, were fibrous, but normal in size and were functioning. Follicles and corpora lutea were present and developing.

Cow was in heat at 5:00 p. m. on April 13, 1924, and went through a normal cycle. The corpus luteum† at this time was in the left ovary, and she ovulated from the right ovary. She had ovulated when examined at 9:00 a. m. on the morning of the 16th. (Ovulated between 40-64 hours after onset of heat.)

The tract showed normal changes during the cycle, and the cow was spayed on April 18, 1924, the ovaries kept, and the condition found checked with those previously observed. On May 25, six weeks after the last heat period, she was injected with 1/5 dose of oestrual hormone, which produced a slight congestion of the cervix, but the uterus showed no changes per rectum. On May 26 and 27, she was injected with 1/5 dose each day. No changes were noted in the uterus, but the cervix was slightly reddened. On June 28, she was injected with two doses

*Prepared by grinding up corpora lutea in sand, then filtering as noted for oestrual hormone. The age of corpora was determined from our data $^{5}/_{10}$ and either grouped, 1-5, 5-10, 10-15 days and injected at corresponding time of cycle, or given "mixed"—the latter during one of above cycles.

†Here we have used Kupfer's terminology. Corpus luteum I refers to corpus from the most recent heat period. Corpus luteum II from the next older period, etc.

of oestrual hormone and all it produced was a slight reddening of the cervix. On June 30, the cervix showed some congestion and its cells seemed to be well filled (folds swollen and prominent). Cow was injected on this date with five doses of oestrual hormone and killed on July 1, 1924.

Postmortem Findings

Vestibule: Petechiae, especially anteriorly; lymph vessels prominent.

Vagina: A few mucous cysts; wall heavy, leathery, wrinkled; on stretching, injected capillaries visible.

Cervix: Congested; petechiae present; slightly open, weeping clear mucus.

Uterus: Yellowish on exterior; somewhat flabby; interior of body red, also showing petechiae; some cotyledons congested in the horns, others whitish from the persistent blood vessels in zone three of mucosa; others showed gelatinous apices; intercotyledonary area gelatinous and mostly of a yellowish cast.

Uterine tubes: Vessels of mesosalpinx markedly injected.

Histology: Marked congestion and edema throughout; desquamation and infiltration similar to no. 52;[10] epithelium of cervix, low (exhausted), of the uterus, low and markedly vacular, all nuclei active. Our findings lead us to conclude this to represent the hyperemic stage of oestrus, even though the eosinophilic infiltration was very slight.

Discussion

The factors known to affect the oestrous cycle are:

1. Heredity.
2. Climatic conditions—wild animals.[24]
3. Food—state of nutrition.
4. The oestrual hormone we have prepared from ox ovaries.
5. Endocrines—through metabolism.

We believe the oestrual hormone will be a valuable therapeutic agent in certain types of sterility.

Oestrous Cycle, Cow 64: Shipped in over a year ago, to be treated for sterility. No heat observed. Genital tract showed a chronic inflammation; vestibule and vagina cyanotic. Cervix enlarged and open, so one could pass a catheter into the uterus without difficulty. Vagina contained from a few ounces up to a pint of muco-purulent material at different times, and its walls at one time showed several small abscesses. Uterus large, fibrous,

and well filled with muco-purulent material. Although the walls were thickened, they were flabby and presented no tone. The uteruswas mostly abdominal. Uterine tubes normal. In the ovaries, the follicles developed but became atretic, and never ruptured; hence no corpora lutea developed. The left ovary had a body in it, which was reduced by massage but never completely disappeared.

Treatment: Irrigation, in the usual manner, benefited the tone temporarily, but after a few days, the condition was worse than before treatment. April 2, 1924, at 2:30 p. m., she was injected with 8 cc of pituitrin (Parke, Davis & Co.), and again at 5:00 p. m., the idea being to contract the uterus and cervix. If there were any results, they were of short duration or practically nil. On April 15, at 9:00 a. m. and 1:30 p. m., she was given 6 cc of ergotin per dose, and the results were practically nil also. The material which accumulated in the vagina contained streptococci, staphylococci, *B. coli*, and *B. pyogenes bovis*.

May 2, left ovary contained a body which had reduced some in size; ovary was firm. Right ovary was larger and doughy. Uterus large and doughy. Cow was injected with 6 doses of oestrual hormone. May 3, the uterus seemed more firm, otherwise no apparent results. May 8, the condition of the tract was about the same, but the mucus in the vagina was clearer and straw-colored. Injected with 6 doses of oestrual hormone at 3:00 p. m. May 9, at 9:00 a. m., cow was bawling and seemed uneasy. Vagina contained several ounces of bloody muco-purulent material. Vagina and cervix congested. Uterus had more tone than before. Under microscopic examination, the oestrual flow contained mucus, red blood cells, leucocytes, and epithelial cells.

May 10, still some blood present in the oestrual flow, condition of genitalia much the same. May 11, no blood present, and congestion of vagina and cervix not so marked. June 3, in heat (25 days). Left ovary had a follicle about 9-10 mm. in diameter, follicle under marked pressure. Right ovary small and firm. Tract looked shiny and was a good color. The vagina contained several ounces of almost clear mucus, with only a few flocculi. Uterus large, erect, and of good tone. June 4, cow went through an apparently normal cycle and ovulated. The corpus luteum developed in the left ovary. She did not come back into heat after 21 days.

June 28, the left ovary had a large, firm body and in it one follicle. Right ovary small and firm. Uterus large, firm, and contained quite a large amount of muco-purulent material. Cow injected with 2 doses of oestrual hormone, with no apparent results. July 6, ovaries remained about the same. Uterus large and firm. Injected with 1 dose of oestrual hormone. July 7, left ovary developing a follicle which is under marked pressure. Right ovary small and firm. Uterus smaller than before and had good tone. Vestibule, vagina, and cervix show a better color; clear, not congested. Some cloudy, dirty-white mucus present. Follicle did not develop and rupture, but became atretic.

July 27, left ovary had a rather large, firm body in it, otherwise rather uniform. Right ovary smaller and contains several small follicles. Uterus in fairly good shape, presents some tone, definite in outline, but contains some fluid. Injected with 6 doses of oestrual hormone. July 28, vagina and cervix more congested, vessels distinctly visible. A few large hemorrhages on lower part of cervix. July 29, not much change, secretion adhesive and cohesive. July 30, condition much the same, not so markedly congested. July 31, injected with 8 doses of oestrual hormone. Secretion clearer, cervix showed a few petechiae. Uterus firmer. August 2, cow killed.

Postmortem Findings

Vestibule: Yellow, gelatinous, lymph vessels small, capillaries visible.

Vagina: Marked vaginitis, thickened folds, some small petechiae. Mucosa very thick.

Cervix: Covered by clear normal mucus. Large, and showed many folds, some petechiae.

Uterus: Walls 9-11 mm. thick. Cotyledons receded. Discolored, thickened, fibrous, leathery.

Ovaries: Very fibrous.

Histology

Vagina: Epithelium thick, due to thickness of cells (6-10 layers); superficial layer, cornified, a little desquamation; mucosa hypertrophic, marked separation of cells, due to homogeneous intercellular substance; marked edema, congestion, leucocytic infiltration of epithelium and adjacent mucosa.

Cervix: Fibrous in first fold, normal in anterior portion.

Uterus: Glands hypertrophied and distended, mucosa congested, leucocytic infiltration. Eosinophils numerous in zone one, some in zone two, very few in zone three. Uterine tubes practically normal.

Discussion

Hypertrophy of vaginal epithelium and mucosa. Hypertrophy of uterine glands, otherwise the usual picture of post-oestrum. We believe this to be the first accurate anatomical record of a case showing oestrus cycle changes superimposed on a clear pathological case of sterility in the cow, although cyclic changes in pathological cases in women are known and described.

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Discussion

Chairman Kernkamp: There are many factors concerned with the problem of animal diseases. We realize them more when we get to working with them. Many people have been misled by certain negative endocrine balances, others that animals are sterile from the lack of certain proteins. It appears to me that most rations are fairly well supplied with the necessary elements. It may be that in a few more or less isolated cases in various sections of the country, one would find some metabolic factors influence diseases of this kind Salt, that is common salt, may be more of a limiting factor than most of the other minerals. At least such is the opinion of Dr. Forbes of the Pennsylvania Station, who did a great amount of work along the line of mineral balances. This is, however, only a metabolic phase of this question.

DR. F. M. HAYES: As a matter of technic, I would like to ask Dr. Murphey how the follicular fluid is secured.

DR. MURPHEY: The first of it was secured at a packing plant at Des Moines. I went part of the time myself. Most of the other trips were made by Dr. McNutt. Our data allows us to place, within two or three days, the actual time cited, by using both the ovary and the tubular part of the genitalia. The tubular part, during the dry stage, was a physiological condition rather than an anatomical one. We cannot place them, but Dr. McNutt's measurements and observations on the ovary allow us to place them. We secured the ovaries at the Des Moines plant and aspirated them while they were fresh.

Recently we have been getting material from Cedar Rapids. Dr. D. A. Eastman, practitioner at Cedar Rapids, is collecting the material. We do not think it is safe to collect this material unless the genital organs are opened and examined, as far as experimental purposes are concerned. We want to be sure we are not using follicles in which there is any macroscopic evidence of disease. If we found such evidence, the material was thrown out. I have seen such material collected in the packing-house, because they pick from pregnant or open animals, young or old, diseased or otherwise.

This is not a criticism. It is purely a statement. I have seen them take glands from tuberculous carcasses, I suppose to make drugs or extracts to be used on people. The glands have a value of about seven dollars and a half a pound.

As far as the corpus luteum is concerned, we group the material in five-day periods: one to five, five to ten, and ten to fifteen. It was ground in a mortar in saline solution and then filtered in exactly the same manner as the other. One- to five-day material was injected at from one to five days in the oestrous cycle. In one cycle we mixed the material, collected enough so we had enough in the beginning to carry us through with mixed material.

I have been very much interested in the discussion of oestrus in the meetings of the Anatomists' Association. Some have come to the point where they have made the statement that the corpus luteum undoubtedly regulated the heat cycle or brought it on, and they cited examples.

Sterility workers express the retained corpus luteum, it drops into the peritoneal cavity where it is usually broken up by leucocytes and reabsorbed. If its hormone causes heat, why must it be expressed and reabsorbed? In situ it prevents heat mechanically, as we have previously pointed out, its expression merely allows a follicle to develop and produce the oestrual hormone.

I confess that this is new material in some respects, but what we have tried to do was to summarize what is known and lead those persons into literature that might be interesting. If we excite a little more interest in the host and take a little away from the parasite, I think we will get farther in veterinary medicine. I was surprised to find, in the *History of the Bureau of Animal Industry*, that they had actually made some physiological experiments.

See America First via Great Northern

COLORADO ENDURANCE RIDE

The Colorado Endurance Ride of 1925 will take place September 21-22-23-24-25, at Colorado Springs, Colo. Preliminary examination of horses entered for the ride will be made at the Broadmoor Hotel stables, Sunday, September 20, and final judging at the stables and at the polo field, Cheyenne Mountain Country Club, September 26. Prizes will be awarded that day, at the Broadmoor Hotel flag pole, at noon. Drs. M. J. Dunleavy, of Denver, and A. J. Savage, of Colorago Springs, have been appointed official veterinarians for the 1925 ride.

STUDIES OF THE CORPUS LUTEUM*

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The corpus luteum, commonly called the yellow body, has a very important function, but comparatively little work has been done upon its life and structure. It is the purpose of the work, as outlined and summarized in this paper, to make a close study and comparison of the different types of corpora lutea of the bovine species. The work will be reported under various headings dealing with the various phases of the study. Briefly, an attempt was made to study the normal structure of this so-called 'yellow body.' From the name 'yellow body' we get the term corpus luteum, corpus meaning body and luteum meaning yellow. Different authors report variations in the size, shape, and color of the corpora lutea of pregnancy and the corpora lutea of non-pregnant animals. A comparison of these and of the microscopical structure will be found in the following pages. A general discussion of the degeneration of the corpus luteum has been taken up under the appropriate heading.

HISTORY AND LITERATURE

As has already been stated, comparatively little information is at hand concerning the corpus luteum proper. Various uses and functions have been discussed and considered as the work of this small structure. No attempt will be made in this paper to deal with that phase of the problem. Different authors have different ideas upon the size, color and shape of the corpus luteum. According to Boyd,[1] the corpus luteum of pregnancy develops to about the size of a marble or an acorn, and occupies a considerable portion of the ovary. The cells contain a yellowish-brown pigment which was called "lutein" by early workers. This same author states that the false corpus luteum does not grow to any great size, and that the histological appearances of both true and false corpora lutea are probably identical. Kingman[2] states that macroscopically one can not differentiate between true and false and retained corpora lutea, and it becomes necessary to take into consideration the history. In another article, Boyd[3] states that in almost every cow, regardless of her

*This paper represents some work done in the Department of Pathology, College of Veterinary Medicine, Ohio State University. Received for publication, November 1, 1924.

condition, one can find a corpus luteum. He says in many cases the corpus luteum is about the size of a cherry.

Smith[4] says that the corpus luteum of the pregnant animal is very much larger than that of the non-pregnant animal. Williams[5] states that the corpora lutea of the pregnant and non-pregnant animals are of the same form and size. The bovine corpus luteum of pregnancy is $\frac{5}{8}$ to $\frac{3}{4}$ inch in diameter and oval in form. He says this corpus luteum is always markedly yellow, lemon or orange in color. Williams,[6] in his other work, states that the corpus luteum of the non-pregnant animal is identical in form, consistence, and volume, with the corpus luteum of pregnancy, but differs in color—the color in the non-pregnant cow being a chocolate. If the ovum is fecundated and undergoes normal development, the corpus luteum is almost always markedly yellow, lemon or orange. However, in another part of the same work, he states that the color distinction is not universally present, and the colors of the corpus luteum of estrum and pregnancy may at times be reversed. In other species, different authors have differed somewhat in their descriptions of this structure, but a discussion of the corpus luteum of only the bovine species will be included in this paper.

Sources of Material

The material collected for study and examination was obtained at two of the local abattoirs. In all, 151 pairs of ovaries with uteri attached were collected. No attempt was made to choose any particular type, but material was taken from every female as she was killed, regardless of age, breed, or condition. Only four animals out of the 151 failed to show the presence of a corpus luteum. Of the 151 animals examined, 62 proved to be non-pregnant and 89 were found to be pregnant. The duration of the pregnancies varied greatly, ranging from that of a few days to almost the end of the gestation period. Ages of feti were estimated by measuring the size and judging the development at the time of removal from the heretofore intact membranes. With comparatively few exceptions the ovaries and reproductive organs were found apparently normal. Only twenty corpora lutea were found which showed any cystic formation or cystic degeneration. These will be discussed, at some length, later in the paper. All corpora lutea and ovaries collected were handled and treated in the same manner, so that comparisons might be made. They were hardened in 10 per

cent formalin until the solution had ample time to penetrate them thoroughly. For the most part, sections of corpora lutea were imbedded in paraffin and sectioned at approximately five microns in thickness. Where technic of staining required, the tissues were frozen and sectioned before special stains were used.

In this paper, it was thought best to use the terms corpus luteum of the pregnant animal and corpus luteum of the non-pregnant animal, rather than the true corpus luteum and the false corpus luteum, or corpus luteum spurious. As a result of the studies made, it was felt that the term "false" was incorrect, from the standpoint of the meaning of the term corpus luteum. The term corpus rubrum refers to those bodies which are red or brick-red in color and have undergone degeneration and atrophy. They have also been spoken of as vestiges, which, in truth, they are. The term cyst is used only for structures which were unmistakably cysts. The only cysts considered were those present within the structure of the corpus luteum. Corpus albicans includes only the vestiges of previous corpora lutea which have given up the red and orange colors and are white or, at least, very pale in color, with merely a slight tinge of yellow or orange.

Size and Shape of the Corpus Luteum

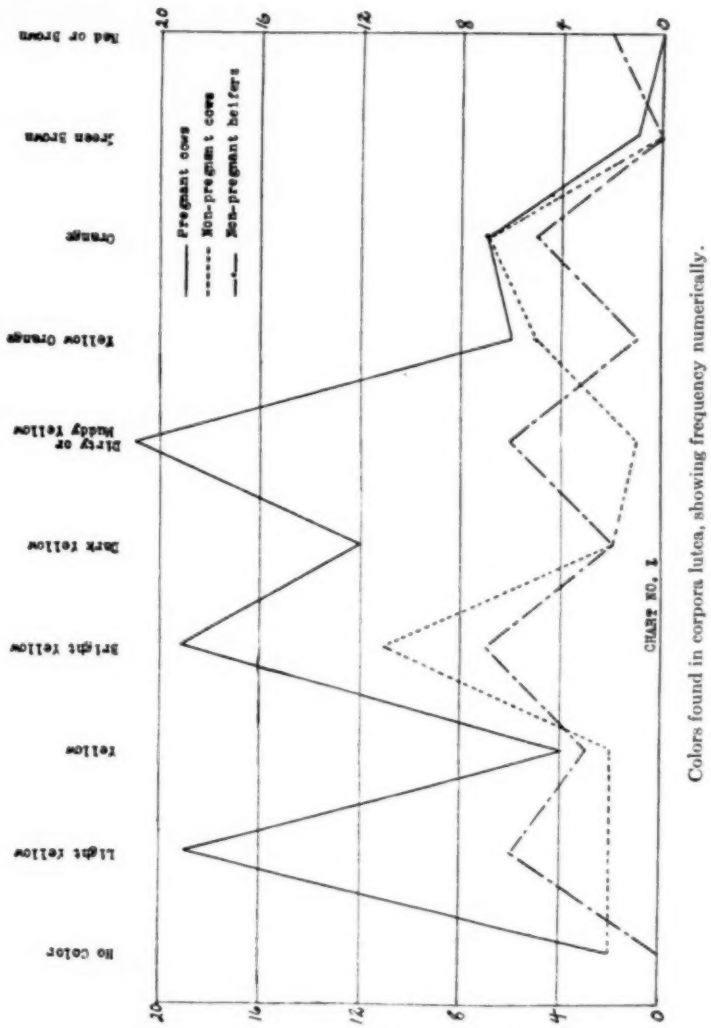
The size varied somewhat, in fact considerably, in the corpora lutea examined. Before taking up the average size, it is necessary to keep in mind that the age of the body has considerable bearing, especially in the non-pregnant animal. Macroscopically, one could not distinguish between the corpora lutea of pregnant and non-pregnant animals by size alone, except in cases where the body had undergone considerable atrophy and the succeeding period of estrum was close at hand. However, from the following average measurements, it will be seen that the corpus luteum of the non-pregnant animal is a little smaller than that of the pregnant animal. In measuring a large number of yellow bodies and taking an average it was found that, in the non-pregnant animal, they averaged 16 mm. by 19.3 mm., while in the pregnant animal they averaged 19.2 mm. by 21.3 mm.

Two animals were encountered that were carrying twins, and in these cases the corpora lutea were considerably smaller than the average size given above. Five non-pregnant animals were found with two corpora lutea present, and in each case (with one exception) they were much smaller than the average

size already mentioned. The largest corpus luteum from a non-pregnant animal measured 23 mm. by 26 mm., while the largest from the pregnant animal measured 25 mm. by 28 mm. The smallest in the pregnant animal measured 15 mm. by 17 mm., while in the non-pregnant they were found much smaller than this. These latter were probably in the stage where rapid degeneration and atrophy were taking place. There was some indication that the corpora lutea in animals where pregnancy was well advanced (five months or over) were smaller than the average, or under 19.2 mm. in the shorter dimension. In 44 animals where pregnancy had advanced to the period of five months or over, 13 were found to be larger than the average and 31 smaller than the average (19.2 mm.). In 47 cases where pregnancy had not reached the five-months period, 25 were larger and 22 were smaller than the average of 19.2 mm. The same general ratio was found to hold true with regard to the longer dimension measurements also. The shorter and longer dimensions were found in bodies which were not truly spherical. In the latter, the measurements were the same. It was not possible to state positively whether or not an animal was pregnant by the shape of the corpus luteum. They are generally spherical or ovoid in both classes of animals. However, occasionally they are found to show more or less of a triangular shape on cut section. Not infrequently they are noticed to be pear-shaped or sometimes flask-shaped, resembling the general contour of an Erlenmeyer flask. The base of the latter shaped bodies was usually toward the interior of the ovary. However, a very few were found where the opposite condition was observed.

One factor bearing considerably on the general shape was the nipple-like projection that was so often encountered in both classes of animals. If this were not marked, then the corpus luteum simulated more the spherical or ovoid shape. If prominent or well developed, the shape more nearly came under the pear-shaped or flask-shaped type. A study of the projection was made in the different classes of animals with the idea that possibly this condition might be characteristic. Apparently there was a tendency for the nipple-like projection to be more prominent in the non-pregnant than in the pregnant animal, and it extended to a greater height above the surface. However, pregnant animals were found in which well developed nipple-like projections were observed and non-pregnant animals were found without any marked development. In the pregnant

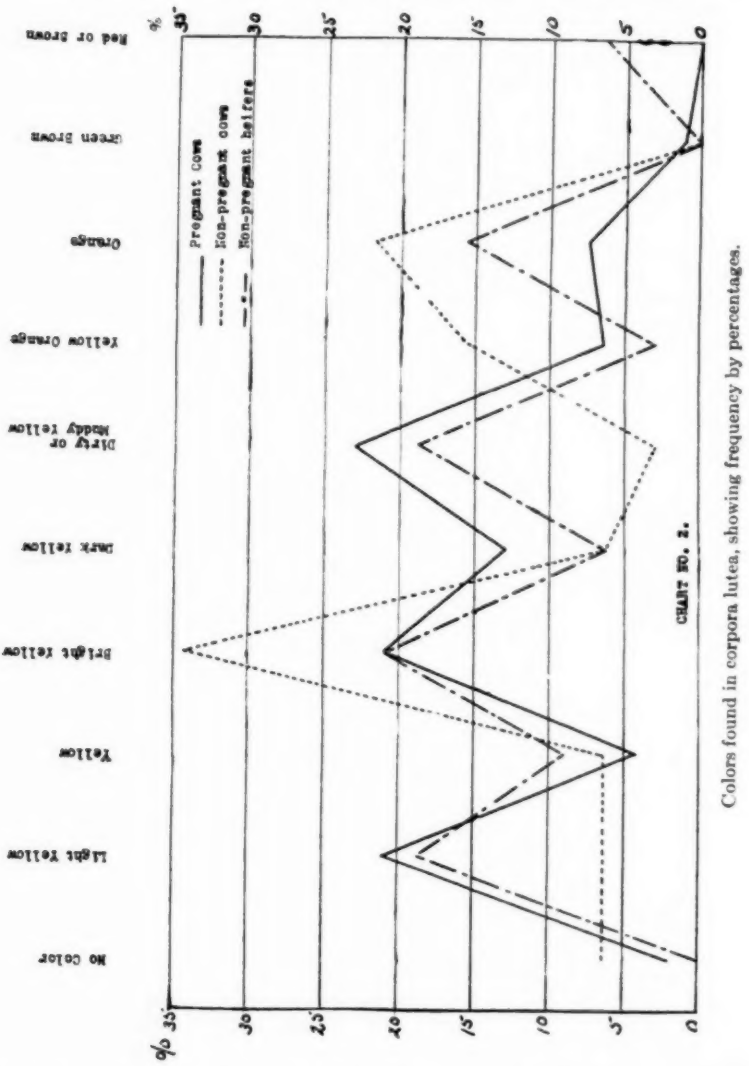
animals, they seemed to be flatter, as compared in height, than in the non-pregnant animals. In the latter, projections were often found extending 5, 6, or 7 mm. above the general surface of the corpus luteum.



The Color of the Corpus Luteum

As has been previously stated, there is some difference of opinion as to the color of the corpus luteum. Therefore, an attempt was made in this work to study the color carefully to determine the exact value of color as an index to whether or not an animal was pregnant. Accordingly a careful check was kept on the colors found, and they were recorded as such.

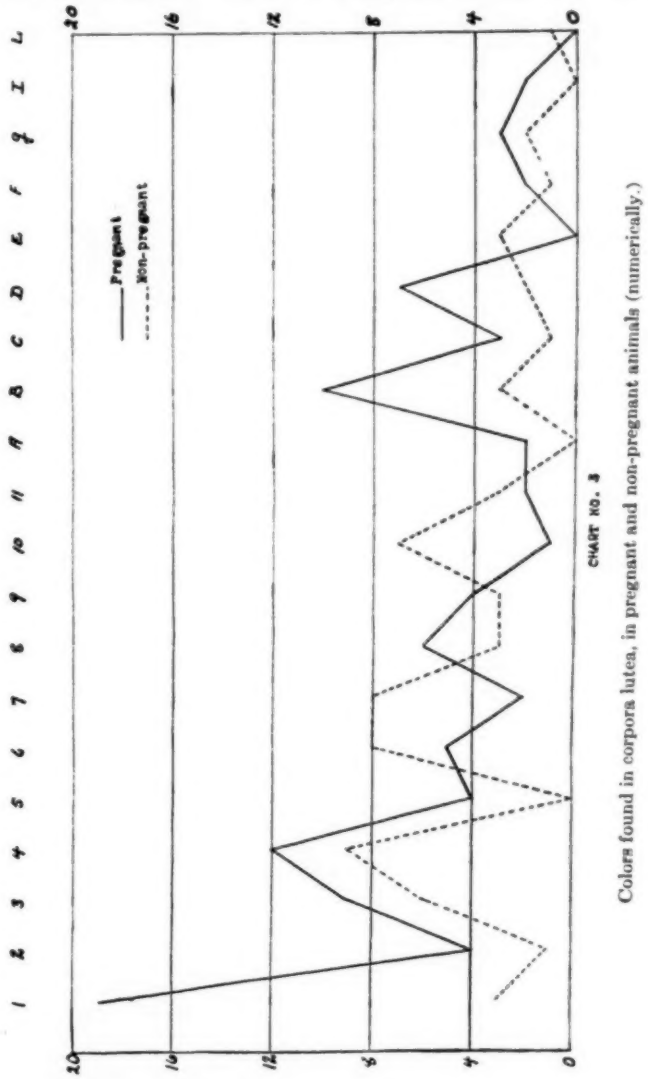
It was found that all the color descriptions would conveniently fall under ten headings, and those used were as follows: no color, light or pale yellow, yellow, bright yellow, dark yellow, dirty or muddy yellow, yellow orange, orange, green brown, and red or brown. The largest numbers recorded were found to fall



under three heads—namely, the light or pale yellow, the bright yellow, and the dirty or muddy yellow. This held true not only for the pregnant animals, but also for the non-pregnant as well. The animals were divided into three groups: pregnant cows, non-pregnant cows, and non-pregnant heifers. To illus-

trate the color findings better, they were charted on graph paper.

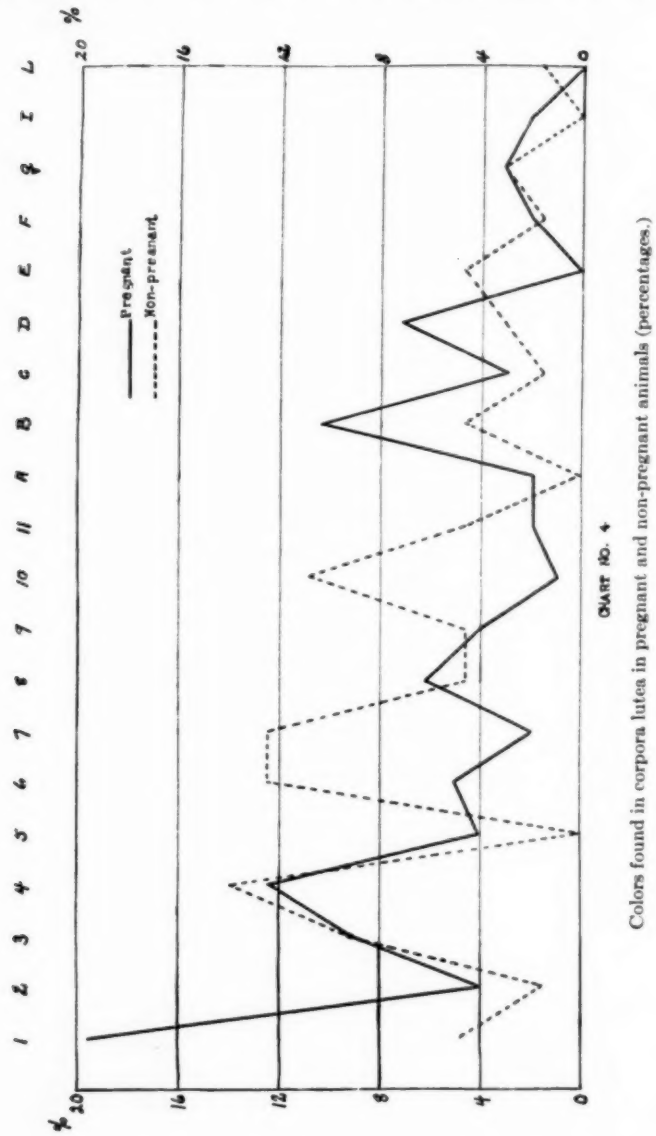
Chart 1 shows the findings using actual numbers of cases. The solid line represents pregnant cows, the broken line the non-pregnant cows, and the interrupted line the non-pregnant



heifers. It will be noted that no particular color is characteristic for a certain class of animals.

Chart 2 shows the same as chart 1, except that it is expressed in percentages rather than in actual numbers observed. Here it can also be noted that no one or two colors were particularly characteristic for any certain class of animals.

A water-color chart was then made to use as a basis of comparison, with the idea of preventing any chance of error in naming colors. The colors were numbered and lettered, one to eleven, and representing colors ranging from a pale yellow to the deeper



yellows, over into the yellow orange and finally the orange. Letters A to L inclusive represented the same colors except that brown was added to correspond with colors found previously and described as a dirty or muddy color. Here the animals

were divided into two classes, the pregnant and the non-pregnant, and colors when matched were recorded by number or letter.

Chart 3 represents actual numbers. Here again nothing characteristic is shown for either class of animals.

Chart 4 shows the same as chart 3, except in percentage rather than in actual numbers. The curve for the pregnant animal runs almost parallel to that of the non-pregnant.

It might be concluded, therefore, from this study, that the color of the corpus luteum is usually a yellow or orange yellow. This color may sometimes be a muddy or dirty yellow. No one color is characteristic for either the corpus luteum of the pregnant or the corpus luteum of the non-pregnant animal.

In considering the color of the corpus luteum cognizance was taken of the duration of pregnancy and its relation to the variation in colors. It was found here also that certain colors were not characteristic for the different periods of pregnancy, nor were the colors of the different periods characteristic when compared with those observed in the non-pregnant animal.

The Corpus Rubrum

When collecting and examining ovaries it was noticed that, in a great majority of cases, when red or brick-red vestiges of any size were present, the animal from which they came was usually non-pregnant. When a careful check was made it was noted that ovaries containing such bodies or vestiges numbered 38 out of the 151 collected. Of this 38, only 6 came from pregnant animals or about one in every six. These structures varied considerably in size from very small and hardly visible to several millimeters in diameter. When frozen, sectioned, and stained with Sudan III, this material was found to contain large masses of fatty material held between large well developed fibers of connective tissue.

Microscopical Structure of the Corpus Luteum

Sections when imbedded in paraffin and cut thin present a rather characteristic picture when stained with hematoxylin and eosin, and Van Gieson's stain. In the corpus luteum of the pregnant animal during the early part of the gestation period, one will observe a structure rather compact in nature. A large number of cells, the lutein cells, are seen which contain a well defined, large, granular nucleus. The cell is rich in protoplasmic material, which usually has a strong affinity for the eosin stain. This property of taking a heavy eosin stain was characteristic

of the lutein cells during early pregnancy. The protoplasm well filled the cell, so that the cell wall was rounded out, giving a general oval or spherical shape to the cell. Between the lutein cells one finds nuclei of the endothelial cells, and the nuclei of connective tissue cells which make up the retriculum of the general structure. Numerous capillaries were found between the lutein cells, in places showing complete networks surrounding the cells. In studying sections of corpora lutea from animals where the gestation period had progressed farther, it was found that the microscopic picture gradually changed. The lutein cells began to decrease somewhat in size, although they continued to take a rather strong eosin stain. Vacuoles began to appear within the cytoplasm where fat globules had been dissolved out in the imbedding process. By the time the period of pregnancy had reached four or five months, the vacuoles or clear spaces were very prevalent and occasionally quite large. The cells by this time were disappearing, some of them quite rapidly, by undergoing fatty degeneration. Small areas of protoplasm could be observed which had lost their nuclei in the degeneration process. As the period of pregnancy progressed farther, the large lutein cells became fewer in number and smaller. They were noted not to take the heavy eosin stain and in some cases the entire protoplasm had been replaced with fat globules or droplets. As a result of the dissolving of this fat in the imbedding process, the tissue looked loose and open, as compared with the structures found early in the period. From the histological appearance, one could readily see that the lutein cells, during the last half of pregnancy, did not function as in the early part of the period. When Sudan III was used as a stain the findings agreed very well with the above. With Van Gieson's stain the lutein cells often took a yellow or orange color, otherwise the section showed the same as described.

In the non-pregnant animal, a somewhat different picture was observed. In the majority of cases, the large lutein cells did not take as heavy an eosin stain as noticed in the cells during early pregnancy. The lutein cells were present, but the protoplasm contained more fat globules. The structure was noted to be more open and loose, as a result of the removal of fatty material. Degeneration in the cytoplasm of the cells had, in most cases, progressed much farther. Often the lutein cells were without a nucleus and the cytoplasm was only a mass of clear spaces and vacuoles which had been filled with fat before

the imbedding process. The connective tissue appeared increased in quantity, but this was, no doubt, due to the degeneration of the lutein cells, and not to a true increase of connective tissue.

The above descriptions are of the opposite types, and it must be kept in mind that these distinctive pictures were not always found. In the first few days following ovulation, the structures of the non-pregnant were very nearly like those described in early pregnancy, but degeneration soon started, as the majority of slides studied showed, as was described above. The corpus luteum of the pregnant animal in the last part of the period of gestation tended to be more like that of the non-pregnant in structure, appearance, and staining reactions.

The reticulum of the corpus luteum is made up of connective tissue which is found throughout the body in fine fibers. Well marked septa are observed in which are located the larger blood-vessels supplying the part. The capillary network was well marked and by seeing it one could easily understand why this yellow body could be absorbed and removed so quickly. This well developed network of blood-vessels also is probably required in the proper functioning of the corpus luteum, sometimes, and properly called a ductless gland of internal secretion. On the outside, corpora lutea are covered with well developed connective tissue capsules in which are often seen large blood-vessels.

Degeneration of the Corpus Luteum

The formation of the corpus luteum follows the discharge of the ovum and its development proceeds to a certain point regardless of whether or not fecundation takes place. The natural assumption would be, therefore, that in the very early stages the corpus luteum of the non-pregnant animal would closely resemble the corpus luteum of the pregnant animal. This fact was found to be true, but apparently not many days pass before considerable change will take place, differentiating the two types more and more. The corpus luteum of the pregnant animal proceeds to develop and form a more or less permanent structure which will, under normal conditions, function for several months. Unless fecundation takes place, this further development does not occur and the corpus luteum of the non-pregnant animal rapidly undergoes degeneration. Generally speaking, as the period of gestation progresses and the corpus luteum comes to the point where it functions less, degeneration

should and probably does normally commence. So this structure, at the time of parturition, although several months old, would be expected to resemble more that of the corpus luteum of the non-pregnant animal late in the twenty-one-day period.

The corpora lutea of both the pregnant and non-pregnant animals undergo a fatty degeneration which is well demonstrated by staining with Sudan III and which will be discussed later. The corpus luteum of the non-pregnant animal undergoes an extremely rapid degeneration and absorption, accompanied by atrophy of the structure. This can be no better illustrated than by the fact that only four animals out of the 62 examined and found to be non-pregnant failed to show the presence of a

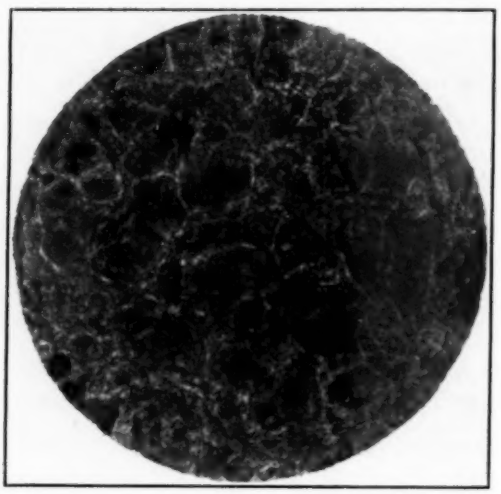


FIG. 1. Section of corpus luteum from animal pregnant eleven weeks. Stained with Sudan III.

corpus luteum. Also, not to exceed the same number, out of the remaining 58, showed that absorption and atrophy had taken place to a very marked degree. Although enough cases are not cited to draw final conclusions, it would indicate that absorption and atrophy take place the last two or three days prior to the succeeding estrum.

By staining frozen sections with Sudan III the fatty content of the corpus luteum was very nicely demonstrated. Figure 1 shows a section of the corpus luteum taken from an animal pregnant about eleven weeks, and stained with Sudan III. It will be noted that the large lutein cells are present with fairly well marked boundaries. The fat contained within them is in

very small deposits uniformly scattered throughout the cell, with the occasional presence of larger droplets of fatty material. Figure 2 illustrates a section of a corpus luteum stained with Sudan III, taken from a pregnant animal in which the fetus was haired out, or the period of gestation was well advanced. Here one can easily note the large lutein cells which contain large quantities of fat, not in small deposits and uniformly scattered, but in large droplets or globules. Some cells can easily be seen to be degenerated considerably more than others.

Figure 3 illustrates a section stained in the same manner, but taken from the corpus luteum of a non-pregnant animal. Note the advanced stage of fatty degeneration with the presence of

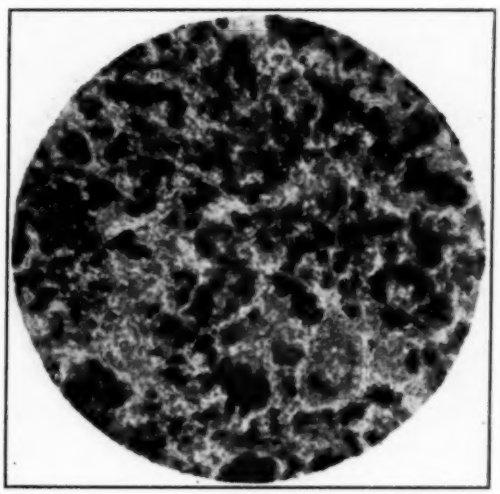


FIG. 2. Section of corpus luteum from animal well advanced in pregnancy. Stained with Sudan III.

large masses of fatty material. In this section one can see an apparent increase in the amount of connective tissue. There is probably very little increase here but rather a decrease in the number of lutein cells from certain parts of the section, and this gives the impression that there is an increase in the connective tissue.

CYSTIC DEGENERATION OF THE CORPUS LUTEUM

Cystic degeneration is one of the common forms of degeneration of the corpus luteum, so it was deemed advisable to include a brief report of the findings that have been made in data collected this far. In the ovaries of the 151 animals examined, only 20

were found in which cysts were present in the corpus luteum. In some cases these cysts were found singly, while in others several small cysts, macroscopic in size, were observed. For the most part the cysts were quite small, varying in size from those just large enough to be seen easily up to those of six or eight mm. in diameter. Only one very large cyst was encountered in any of the structures. It is worthy of note to know that only one of the twenty containing cysts proved to be from a pregnant animal, and that particular cyst was not large, measuring just five mm. in diameter. The question was raised, Would this animal ever abort? At the time she was killed, she was found to be pregnant only five or six weeks. It would have been

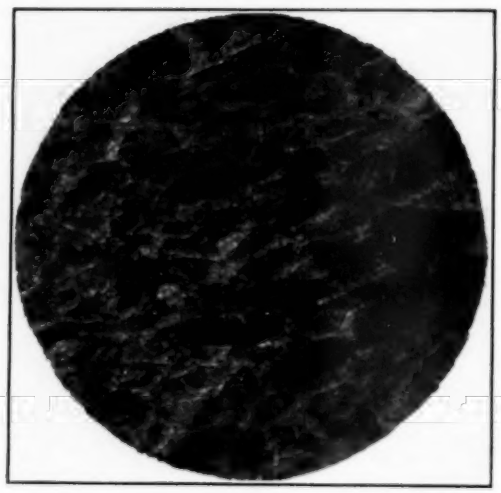


FIG. 3. Section of corpus luteum from non-pregnant animal. Stained with Sudan III.

interesting to have known such a condition was present and been able to watch the animal throughout her gestation period. In two cases, two corpora lutea were found present, one being located in each ovary and each one was found to contain small cysts. It was not always true, however, that mascrocopic cysts were present when two corpora lutea were found in the same non-pregnant animal.

This cystic degeneration is probably a form of hyalin degeneration, and starts near the center of the corpus luteum. Indications are that the degeneration commences in several different spots and that these soon coalesce and join together, forming the larger cyst cavities. The cavities are filled with an almost

transparent fluid rather thick in consistency. The walls of the cyst are made up of connective tissue, probably derived from the connective tissue septa which are noted throughout the corpus luteum.

Summary and Conclusions

1. A very large percentage of female animals killed in the abattoir shows the presence of a corpus luteum.

2. Macroscopically one cannot distinguish between the corpora lutea of pregnant and non-pregnant animals by the size alone.

3. Considering average measurements, the corpus luteum of the non-pregnant animal is a little smaller than the corpus luteum of the pregnant animal.

4. The corpus luteum of the animal well advanced in pregnancy tended to be smaller than that found in early pregnancy.

5. It is not possible to determine whether or not an animal is pregnant by the shape of the corpus luteum.

6. The shape is generally spherical or ovoid, but may vary considerably.

7. The nipple-like projections were somewhat more marked in the non-pregnant than the pregnant animals.

8. The color of the corpus luteum is usually a yellow or orange yellow, and may sometimes be a muddy or dirty yellow.

9. No one color is characteristic for either the corpus luteum of the pregnant or the corpus luteum of the non-pregnant animal.

10. The corpora lutea of the pregnant and non-pregnant animals present a definite, rather characteristic microscopic picture when stained with hematoxylin and eosin.

11. Indications are that absorption and atrophy of the corpus luteum take place the last two or three days prior to the succeeding estrual period.

12. The corpus luteum normally undergoes a fatty degeneration.

13. Corpora lutea undergo a cystic degeneration which is probably pathological.

14. Cysts are very seldom found in the corpus luteum of a pregnant animal.

15. The cystic degeneration is probably a hyalin degeneration.

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OBSERVATIONS ON CERTAIN DIURNAL PHASES OF RUMINATION

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The available data on the external manifestations of rumination are very limited, this being especially true of the time elements of the act as a whole and of its various parts. It was with the intention of increasing our information in this regard that we carried out 24-hour continuous observations on two cows at the College dairy farm. This study included determination of the total number of hours devoted to rumination, the time of day of rumination, the duration of the periods of rumination, the number of boluses ruminated, and the average time spent masticating a representative number of boluses. The observations were made by four men, two men to each cow, working in shifts of twelve hours each. The timing was done by the use of the ordinary watch and the stop watch. In this paper there are presented, in a summarized and graphic way, the results of this investigation.

The animals were housed in the College dairy barn, in box stalls, under ordinary conditions. The observations were begun at noon on November 10, 1923, and were concluded at the following noon. The animals were milked, fed, and watered as usual, i. e., morning and evening. The ration of the Jersey cow consisted of 13 pounds of grain and 13 pounds of silage, with hay *ad libitum*. The Guernsey cow received 13 pounds of grain and 20 pounds of silage, with hay *ad libitum*.

Number of hours devoted to rumination: The Jersey cow spent 8 hours and 22 minutes ruminating, during the 24-hour observation period. The Guernsey cow ruminated 6 hours and 42 minutes during the same period. These figures compare favorably with the estimate of at least 6 hours, made by Colin, many years ago.

Distribution of rumination periods throughout day: The literature contains, so far as we know, no information on this point The results of our observations can best be shown in the accompanying chart. It will be noted that the periods are

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remarkably evenly distributed over the 24 hours. The greatest breaks come around the milking, feeding, and watering times, especially at the evening period. The Jersey cow ruminated in 20 periods, the shortest period being only 2 minutes in length,

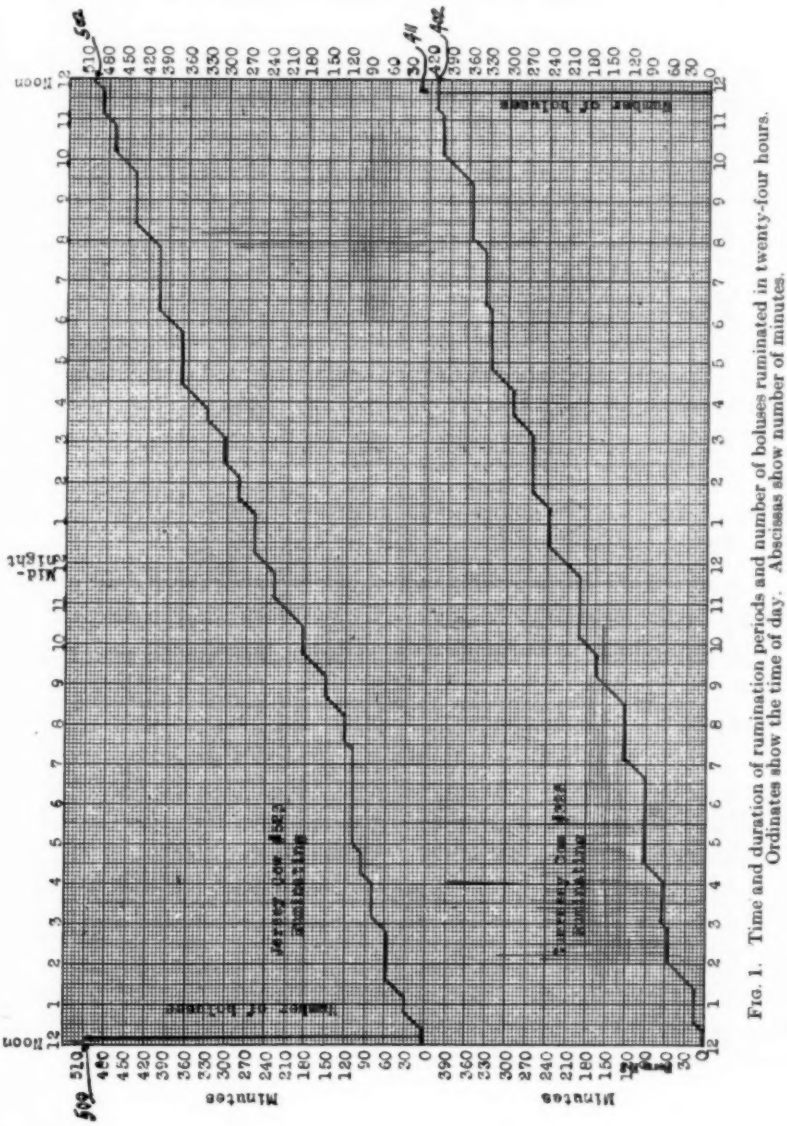

FIG. 1. Time and duration of rumination periods and number of boluses ruminated in twenty-four hours. Ordinates show the time of day. Abscissas show number of minutes.

the longest 49 minutes and the average 25 minutes. The Guernsey cow ruminated in 15 periods, the shortest being 5 minutes long, the longest 52 minutes, with an average of 27 minutes.

The number of boluses ruminated and the average time devoted to each bolus: The Jersey cow ruminated a total of 509 boluses in 502 minutes. Thus, this cow spent on the average 59.1 seconds on each bolus, the average time devoted to the actual mastication of a bolus being 54.1 seconds (average of 217 boluses). Subtracting this figure from the one given above, it is seen that 5 seconds represent the time devoted to the phases of rumination other than the remastication, i. e., the regurgitation, the deglutition, and the slight pause that follows the swallowing of the bolus.

The Guernsey cow ruminated a total of 411 boluses in 402 minutes, this giving an average time of 58.6 seconds to each bolus. The average time spent actually masticating a bolus was found to be 53.8 seconds (average of 342 boluses). This gives a value of 4.8 seconds to the acts of rumination other than the remastication.

Our figures compare favorably with those of Colin[1] who years ago determined that the ox devotes an average of 54.5 seconds to each bolus. This is about the figure we obtained for the remastication time.

SUMMARY

1. Two producing dairy cows of different breeds, Jersey and Guernsey, were kept under ordinary dairy barn conditions, with customary attention as to feeding, watering, and milking. These animals were subjected to 24-hour continuous observation.

2. The Jersey cow ruminated 8 hours and 22 minutes in 24 hours; the Guernsey cow 6 hours and 42 minutes.

3. The periods of rumination (20 for the Jersey cow and 15 for the Guernsey) were remarkably evenly distributed over the 24 hours. The shortest period was 2 minutes, the longest 52 minutes, the average for both cows 26 minutes.

4. The total number of boluses ruminated showed a marked parallelism to the total number of minutes of rumination (see chart).

5. The average time devoted to each bolus was approximately 59 seconds. Of this time about 5 seconds were spent on the processes of rumination other than the remastication (and reinsalivation).

ACKNOWLEDGMENT

The authors desire to acknowledge the co-operation extended by the Animal Husbandry Department of the College in the collection of the data included in this paper.

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POISONING OF CATTLE BY SWEET CLOVER HAY*

By ALVIN BROERMAN, *Reynoldsburg, Ohio*

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Sweet clover is utilized as a hay, pasture and green manure in many European countries. It is used as a fodder plant for horses and cattle in India. In the United States it is recommended as a pasture crop for cows and will furnish an abundance of pasture for six months in the year. It is especially useful in restoring badly eroded land, as it will often grow where other crops frequently fail. Many run-down farms are being restored to fertility and profit by the use of sweet clover as a mulch and green manure. In some sections of America sweet clover is used in the production of ensilage. In Ohio it is commonly known as a wayside weed. The white (*Melilotus alba*) and yellow (*M. officinalis*) are the only species of sweet clover of importance in this state.

The fall crop of the first year is generally preferred for hay, since the growth at that time is finer and the hay is of better quality. It is usually cut just as it is coming into bloom. Many consider this crop as being practically equivalent to good alfalfa hay. Great care is necessary in preparing the hay as the leaves of sweet clover shatter even more than alfalfa. Contrary to the general belief, live stock will readily eat good sweet clover hay and thrive. A few individual animals may refuse sweet clover at first but will soon acquire a taste for it. However, the feeding of *some* sweet clover hay is not without danger.

During March, 1924, the Department of Agriculture of Ohio received a report from Delaware County that cattle were affected with a disease resembling blackleg. Ten cattle died in this herd. Only one animal survived. The young stock was the first to show evidence of being affected. About a month later the department was called to investigate a similar condition in Warren County, where nine cows died. One cow in the herd apparently recovered and another never became affected. All of the cattle that died and those affected had been fed sweet clover hay for a number of weeks.

The symptoms observed were impaired appetite, stiffness and lameness. The mucous membranes appeared pale. Subcu-

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taneous, non-crepitant swellings, varying in size, occurred in some of the muscles. The temperatures of the animals remained about normal. They all died in from one to three days after the first symptoms were noticed.

Postmortem examinations held on the cattle showed groups of muscles to be of a dark color and infiltrated with blood. The surrounding muscles were pale. The location and extent of the lesions varied in the different carcasses. Hemorrhages were present on the epicardium and pleurae in all cases. In some of the carcasses the abdominal cavity contained a bloody fluid. The hemoglobin content of the blood was reduced. The blood showed no tendency to coagulate.

Smear preparations and cultural methods did not reveal the presence of bacteria in the blood and internal organs. Rabbits and guinea pigs injected subcutaneously and intraperitoneally with blood from the affected cattle remained healthy. Our examinations did not indicate that the cattle were infected with blackleg, with which it has been confused, or any other type of bacteria and for that reason the sweet clover hay was suspected of being the cause of the trouble. The hay procured from Delaware County was mouldy, while the hay on the farm in Warren County appeared to be of good quality.

Feeding Experiments

Sweet clover hay was obtained from the farm in Delaware County for feeding experiments. Hay of this same character had been fed to the herd in which ten cattle died. On April 18, 1924, a feeding experiment was started in which two yearling bulls, a Hereford and an Aberdeen Angus were used.

The Hereford bull appeared weak and dull and moved with a stiff gait, twenty-four days after being fed sweet clover hay. No symptoms were observed until this time. The visible mucous membranes were blanched. The following day a small vein near the tip of one ear was severed to collect blood for study. Styptics were used and the cut cauterized with a hot iron in an attempt to stop the flow of blood. Although the cut was very small the blood did not coagulate. The blood was of a pale color. This bull died twenty-nine days following the feeding and postmortem examination showed ecchymoses on the pericardium and endocardium, diffused bloody areas on the serous surface of the rumen and hemorrhages in the subcutaneous tissue.

The Aberdeen Angus bull appeared normal until the twenty-

eighth day following the feeding of the hay. At that time he was stiff when urged to move and later became very lame. A large swelling developed rapidly in the left shoulder and leg, which was only slightly painful and did not fluctuate or pit. There was no evidence of gas formation. A fluid containing a small amount of hemoglobin was present on the mucous membrane of the nostrils. This bull died thirty-one days after the feeding experiment was started. Autopsy held on this animal showed the muscles of the left leg, shoulder and neck to be infiltrated with dark-colored blood. Large dark-colored areas were present in the subcutaneous tissue of the back and abdomen. Also an edematous swelling was found in the region of the dewlap. There were many petechial and ecchymotic hemorrhages on the pericardium, epicardium and on the anterior lobe of the left lung. A bloody area was present on the pleura of the right side of the thoracic wall and a large hemorrhagic area on the serous surface of the rumen. Blood-colored areas were found on the serous surface of the bladder and a few hemorrhagic areas on the mucous membrane of the intestine. The blood was of a pale color and did not clot readily.

Temperatures Remain Normal

The temperatures of the two bulls were taken daily and found normal. Bacteriological examinations made of material collected from these animals were negative. This experiment showed that it was necessary to feed the sweet clover hay for a month before it caused characteristic symptoms and death. Death in these cases was evidently produced by hemorrhage.

A heifer weighing 490 pounds was fed sweet clover hay from the farm in Delaware County. This experiment was started December 6, 1924, in order to demonstrate the lesions found in cattle poisoned by sweet clover hay. The heifer gained in weight and remained apparently well until thirty days after being fed the hay. On January 5, 1925, the feces were mixed with blood, there was loss of appetite, weakness and the visible mucous membranes were pale. The following day an edematous swelling appeared in the submaxillary region. The heifer was found dead on the morning of January 7, 1925. The temperature remained normal during the thirty-one days that the hay was being consumed. Postmortem examination showed a large amount of blood in the abdominal cavity. The blood did not coagulate. The muscles of the right side of the head, neck and abdomen

were of a dark color. A similar condition was observed in some of the muscles of the left limb. There were a number of hemorrhages on the pericardium. The hemorrhages in this case were principally internal.

Etiology

All sweet clover does not have poisonous properties, as many farmers have fed it to stock for years without losses. The question naturally arises, therefore, Why is some sweet clover hay responsible for this disease? Literature does not contain many references to sweet clover hay poisoning. Schofield,[1] in reporting this condition from the province of Ontario, states that the disease is produced by a toxic substance which is present in mouldy sweet clover and that there is much evidence that certain moulds are responsible for the formation of this poisonous principle. Mayo[2] reported losses from feeding damaged sweet clover hay to cattle in Illinois. Gain and Brocq-Rousseu,[3] in "Traité des Foins," speak of sweet clover as poisonous to cattle, sheep and horses. Ewart and Torey,[4] in discussing the poisonous plants of Victoria, in 1909, state that coumarin is present in Melilotus and an excess of this will cause a disinclination to locomotion, produce paralysis and result in death.

The exact nature of the toxic substance in sweet clover hay which causes this disease in cattle has not been established. It is not definitely known whether it is due to some toxin in the plant or whether it is produced by the growth of moulds or other microorganisms. Schofield's work would indicate that the moulds are responsible for the conditions resulting from the feeding of sweet clover hay. However, it is to be remembered that not all mouldy hay is necessarily poisonous. Schofield's observations would also tend to show that this condition is not caused by a deficiency of some essential food element. The toxic substance apparently delays the clotting time of the blood, destroys the red blood cells, and injures the vital tissues of the body to such an extent that hemorrhages result, which in turn cause death.

Prevention and Treatment

It is important that veterinarians and stockmen recognize the possible danger of feeding sweet clover hay. Our observations showed a mortality of from 80 to 90 per cent. The young and most thirfty animals in a herd are usually the ones that first show evidence of this disease. Also, because of the changes

induced in the blood, resulting in its failure to coagulate, cattle fed the hay may die of hemorrhages following castration, dehorning or parturition.

When an animal in a herd shows symptoms of this condition the feeding of sweet clover hay should be discontinued immediately and the cattle kept quiet to prevent hemorrhage. Supply good food and an abundance of water. The injection of freshly drawn blood serum has been recommended as a means of controlling the hemorrhages. The character of the lesions and history of the herd should readily differentiate sweet clover hay poisoning from blackleg.

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COMPARATIVE VALUES

"Doctor Smith seems to be a wonderful man," said Mrs. Snobleigh, "He charged me $25.00 to come and see Mimi. Dr. Brown is a robber," said Mrs. Snobleigh. "He charged me $10.00 to come and see Barbara."

Doctor Smith is a veterinarian. Mimi is Mrs. Snobleigh's Peke dog. Doctor Brown is the physician. Barbara is Mrs. Snobleigh's small daughter. Barbara was really sick, Mimi had merely been fed too much candy, so Mrs. Snobleigh had paid Dr. Smith and Dr. Brown is still waiting for his.

D. R. F. in *Life*.

ON THE WAY TO PORTLAND

The new Yreka Inn, at Yreka, California, on the Pacific Highway, 375 miles south of Portland.

FURTHER REPORT ON ABORTION IN CATTLE WITHOUT DEMONSTRABLE CAUSE

By J. TRAUM *and* G. H. HART

University of California, Agricultural Experiment Station, Berkeley, California

The writers[1] have previously published on observations of abortion disease without demonstrable etiological factor. Three cases of this nature have recently occurred in animals under our observation on different premises and under such conditions that we felt they were worthy of being reported. No doubt similar cases have been encountered by others, but these are presented with the view of discussing their relation to the control of the disease.

CASE NO. 1. FIELD DEMONSTRATION ON THE ELIMINATION OF TUBERCULOSIS AND INFECTIOUS ABORTION SIMULTANEOUSLY BY A MODIFIED BANG SYSTEM

These animals were a part of a large herd of young cattle, all of which had been separated from adult animals at birth or within a few days thereafter and kept on separate premises several miles from adult cattle. With the exception of the colostrous milk nursed from their dams during the first day or two of life by a portion of these calves, only carefully pasteurized milk had been fed to them. This milk was pasteurized and then brought on to the premises in specially marked cans used for this purpose only. All precautions that could be used under practical conditions on a large ranch were taken to protect the animals from infection with tuberculosis. The herd from which they originated, numbering 670 head when first tested, was heavily infected with this disease.[2] That these precautions had been reasonably successful was evidenced by the fact that upwards of 450 head had been so raised with only eleven animals reacting to the tuberculin test. These, it is believed, received the infection during the first days of life before they were removed to the calf ranch.

This modified Bang method of rearing healthy herds from tuberculous ones is the most practical under some conditions found in this state. With such a system of raising young stock,

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it can readily be seen that opportunity for abortion infection to gain access to them is very remote, and this is an additional decided advantage to the method.

Agglutination tests of the blood of these animals for the presence of abortion were regularly made when they were old enough to be bred. To April 1, 1925, 229 animals have been tested and in no case has a positive reaction occurred.

On February 9, 1925, one of the bred heifers aborted a five-months fetus, which was immediately dispatched by special messenger to the laboratory for examination.

To that date, sixty-two of the animals had calved normally with the exception of one case of dystocia, and 83 additional animals were pregnant.

Laboratory Examination of Fetus:

In fifth month of gestation.

Showed few hemorrhagic blotches on head and blood-tinged serous fluid in abdominal cavity—otherwise, apparently normal.

Cultures were made on cooked blood-agar from the heart, lung, liver, spleen, stomach contents and meconium, but all remained sterile.

Smears were made from the various tissues, but nothing definite was found.

Guinea pigs 4341 and 4342 were inoculated with the heart, lung, liver and spleen extract and guinea pigs 4343 and 4344 with the stomach and intestinal contents, including meconium.

All four of the guinea pigs were killed March 25, 1925, and were normal. Cultures made from the spleens remained sterile, and samples of their blood were negative to the agglutination test.

Case No. II. Control of Abortion by the Agglutination Test and Removal of Reactors

In carrying out studies on the value of the agglutination test with the removal of reactors to eliminate abortion infection from herds, it has been our practice to keep active one field trial of the method. On June 30, 1924, we applied the first test to a herd of 160 head of animals, constituting the dairy herd at one of the state institutions. There were 24 (15%) reactors to this test and as there was opportunity to isolate these animals in a fairly satisfactory manner until they could be disposed of, we decided to continue testing the entire herd.

On the fourth test, made January 13, 1925, only one new reactor was found. On February 13, 1925, one cow, which had passed all the four tests without any indication of a reaction, aborted a five-months fetus, and it was delivered to the laboratory by special messenger.

Cultures from lung, liver, spleen, stomach and heart-blood revealed nothing of diagnostic value. Four guinea pigs, inoculated with lung, liver, spleen, and stomach and intestinal con-

tents, showed no evidence of *Bacterium abortum* or other infection. Blood samples of the guinea pigs when killed gave negative agglutination tests. Spleen cultures from them were also negative.

A fifth agglutination test on the cow, made March 13, 1925, also resulted in complete negative findings.

Case No. III. Demonstrating Permanent Infection Not Caused by Feeding Calves Abortion-Infected Milk

In the course of our abortion experiments at this Station, a considerable number of calves have been available from our experiment animals. A long-time experiment has been under way with these young animals. The object of the work was to determine the effect, of feeding abortion-infected milk to the animals during the milk-drinking period, on their first pregnancy. The beginning work on this experiment has already been published by C. M. Carpenter.[3] Those animals that were to be allowed to live long enough to complete their first gestation period were fed *Bacterium abortum* in milk until they were weaned at six months of age. From that time on they were protected from further infection and at about fifteen months of age, or slightly over, they were bred.

At various intervals of time, animals in this group were slaughtered and an extensive examination made of their lymph glands and tissues for the presence of the *Bacterium abortum*. After postmortem examinations had quite well established that no *Bacterium abortum* organisms remained in the bodies of these animals, one of them (1762) aborted a five-months fetus. This animal was born April 6, 1923. It received *Bacterium abortum* daily in the milk fed to it until it was weaned, October 6, 1923. This animal was 15 months old on July 6, 1924, and was bred on July 1, 1924. A test was made of the blood from the animal monthly from June 8, 1923, to date and on all the tests it was completely negative with the exception of those made on July 11 and October 24, 1923, when it gave positive reactions in a dilution of 1 to 25 and negative in all the others.

On the evening of January 21 or the morning of January 22, 1925, without any premonitory signs, this animal aborted the fetus conceived with the July service. The animal was in the pasture, at the time, with the remaining pregnant heifers of the group. The fetus and placenta were found in the pasture and

brought to the laboratory for examination on the evening of January 22.

The fetus was normal and well developed. The placenta appeared to be dry and shrivelled, with the cotyledons pale. In some places there was slight edema present.

Two cultures were made from each of the following tissues on glucose glycerin agar: heart, lung, liver, spleen, stomach contents and meconium. All of these cultures remained sterile. The following guinea pigs were injected with tissues:

No. 4291—Lung, liver, spleen extract.
No. 4292—Stomach contents and meconium.
No. 4293—Fetal cotyledons.
No. 4294—Colostrum.

Guinea pig 4293 died three days following inoculation. The other three were killed, March 4, 1925, and were normal through out. Their blood-sera gave a negative reaction to the agglutination test with *Bacterium abortum* antigen, and cultures made from their spleens on cooked blood-agar remained sterile.

Discussion and Conclusions

As pointed out in our previous articles and observed by other workers, there is no question of the occurrence of abortion without a demonstrable etiological factor being present. In the aggregate, such abortions are not of great economic importance to the live stock industry. However, unless they are properly diagnosed, they become a source of serious annoyance and even discouragement where efforts to control Bang abortion infection are under way. For that reason, the occasional occurrence of such cases must be recognized and not considered as failures in the methods of control of Bang abortion disease.

This conclusion must not be too quickly made by the field worker in all cases without complete laboratory examination. In our work on the control of abortion disease by the agglutination test, we have had cases of Bang abortion in which the blood test of the animal was entirely negative. However, no difficulty was experienced in isolating *Bacterium abortum* from the fetus.

These facts are placed before the reader not as an argument for or against any of these methods of control, but simply to call attention to the necessity of giving proper intepretation to field observations.

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PRELIMINARY REPORT ON PERIODIC OPHTHALMIA IN THE HORSE*

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NATURE OF THE REPORT

This report consists of two parts: first, a very brief consideration of the present status and, second, a report of clinical work being carried on by the Veterinary Division of Iowa State College.

It is not my purpose to startle you with any new discovery or theory, but rather it is my hope to stimulate a deeper and more general interest in the subject of eye diseases, and perhaps from information obtained through our combined efforts we may make greater progress in this field than has been possible in the past. We should at least be able to reach a common understanding and establish a definite policy concerning certain phases of the disease that would merit the respect of horse breeders and educators.

Needless to say our past practices and varied forms of advice concerning periodic ophthalmia have lead to confusion and too often warranted the lack of respect shown on the part of the breeder for our judgment. Perhaps one reason for lack of a clear-cut, forward-looking policy concerning this disease may be the fact that too often we have taken the easy course and played into the hands of horse dealers rather than the horse industry. The disease is now gradually being recognized by horse breeders as perhaps the greatest curse to the horse industry today, and therefore constitutes a real challenge to the profession. In presenting this report we wish to invite your cooperation in the adoption and carrying out of some definite plan of investigation which may continue over a period of years.

NATURE OF THE DISEASE

Law[1] defines the disease as "an inflammatory affection of the interior of the eye, intimately related to certain constitutions, soils, climates and systems of management, showing a strong tendency to recur again and again and usually ending in blindness from cataract or other destructive lesions." I think that this

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definition, perhaps as good as any we can offer today, furnishes an outline for us to follow in making observations which, when carefully considered and tabulated, may or may not conform to the definition.

Distribution

According to reports this disease is widely distributed and has been studied more or less for at least fifty years. While some progress has been made concerning the knowledge we have of the sysmptoms, course and pathology of the disease, we still appear to be rather peacefully groping in the dark. We need only to read some of the recent papers on this subject to realize the seriousness of the condition, since the percentage of blindness from this source is estimated to range from four to seventy per cent of the horse population of various counties and districts reported.

Our own observations during the last three years, on fifty-six horses over one year of age, show that seventeen have had or are having attacks of the disease. In other words approximately thirty per cent of the animals are affected. It is true that some regions are reported entirely free from this disease and a thorough comparison of conditions might be very helpful. Sir Arnold Theiler, during his recent visit at the College, stated that the disease was known in South Africa during the Boer War, but only among horses imported by the British, and that when these horses were taken from the country the disease also disappeared.

Cause

The cause of periodic ophthalmia is still unknown and even the relative importance of the so-called contributing factors or causes has not been given sufficient emphasis by the profession nor serious enough consideration by the breeders. Concerning the cause, Law[1] presents strong arguments in support of certain probable contributing factors, such as: first, wet, impermeable, swampy or undrained soils. He quotes statistics of various experiments and observations carried on by investigators in European countries which seem to show conclusively that weather, climate and soils are at least associated with the cause of the disease, either in a direct or indirect way. Second, damp, cold, basement stables and insan'tary conditions are also cited. Third, fodders of a heating or starchy nature, like Indian corn, buckwheat or wheat. (Author's note: While these are mentioned, as a possibility of diet playing a part, they are

in no way supported by definite data.) Fourth, heredity, and this he states must be accepted as one of the most potent accessory causes. He also states that hereditary susceptibility is so strong and pernicious that intelligent horsemen everywhere refuse to use for breeding purposes either stallion or mare that has once suffered from recurrent ophthalmia, and that at the government studs in France, not only is every unsound stallion refused, but the service of the healthy stallion is refused any mare which has suffered from disease of the eye.

Finally he states, "It will be recognized that none of these fully account for the specific and recurrent nature of the affection, and it is felt that something more is wanted to complete a full and satisfactory explanation of the malady." He then gives the bacteriological findings of several noted investigators, including Robert Koch, and also states that Potapenke found in the blood of the affected horse a plasmodium like that of ague, which agrees with the damp regions in which the malady prevails and also with the intermittent and periodic character. Other writers[2-19] since Law's work was published have, for the most part, presented the same material or certain parts thereof in a little different way The late Dr. Edward Merillat and August Bonazzi[20] concluded from their studies that this condition is probably a deficiency disease associated with acid soils, unbalanced rations, improper stabling and over-work, rather than being due to infection.

Periodic ophthalmia was so prevalent and considered to be such a serious menace to the Allied armies during the recent war, that a conference of army veterinarians was at one time held in France, to establish if possible a common understanding concerning the disease and methods of combating same. Considerable emphasis was given to sanitary measures, as perhaps the most logical conclusion, in the control of the disease.

Symptoms

I do not consider it necessary to go into a detailed description of the symptoms at this time, but will call your attention to them briefly in order that we may understand one another. The symptoms, course and pathological changes of the disease seem to vary a great deal, depending upon, first, the number of attacks the eye has suffered, second, the severity of these attacks and, third, the structures involved during the attack.

We have often observed cases of mild photophobia, lachry-

mation and conjuctivitis, which would respond early to the application of a hot boracic acid pack and which we were inclined to consider merely as cases of conjuctivitis. Often within a few days or months these same animals have been returned, suffering from a severe attack of what we commonly call periodic ophthalmia. This diagnosis has been repeatedly confirmed by the fact that any such attacks have been observed to have recurred again and again and finally produced blindness. Again, you have all seen those first attacks of the disease in which the lids were edematous and apparently swollen shut; a profuse discharge is present, sometimes watery, sometimes of a mucopurulent nature, and the animal exhibiting signs of acute pain and being hypersensitive to light. From all outward signs and appearances, the eye is suffering from a panophthalmitis and it is too often attributed to trauma or influenza.

If we carefully examine eyes during the course of such attacks we are able to observe various symptoms and changes, any one or most of which may be present in a single case. I refer to conditions such as, first, opacity of the cornea (quite rare); second, turbulent aqueous humor, often containing a precipitate resembling pus; third, anterior synechia; fourth, pupil completely contracted and, when due to an acute iritis, or iridocyclitis, it often fails to respond to mydriatics unless repeated for perhaps several days consecutively. The iris appears thickened at the pupillary edge and there may be noted considerable injection at the corneo-sclerotic juncture. (The contracted pupil may be due to the fact that the retina is so involved in the disease as to be acutely sensitive to light.) Fifth, posterior synechia. When this exists to such an extent as to cause the iris almost to cover the lens, one is unable to make observations on the lens or deeper structures. Sixth, cataract; and let me emphasize that to determine this condition one must examine the lens very closely. No one would fail to recognize a total opacity of the lens, but cataracts may have their origin merely in dark spots or streaks, affecting either the lens or the lenticular capsule. Seventh, displacement of the lens. Eighth, hemorrhagic condition of the vitreous body presenting a dull, prune-juice appearance. Ninth, detached and what appear to be floating strands of retina. Tenth, degenerative changes in the retina and choroid. Eleventh, depressed and pale appearance of the optic papilla.

To note most of these conditions one must first be able to make a thorough examination of all of these structures, and

second, he must be thoroughly acquainted with the appearance of the normal structures. By careful study of the eye it is surprising how often you will find some pathological change existing in some structure of the eye, even to the extent that the animal may be considered totally blind in an eye which has all the outward appearances of being normal. In many instances there are no pathognomonic symptoms of the disease so far as I have been able to observe, and it is therefore very difficult if at all possible to make a positive diagnosis in such cases. In stables and localities where the disease is common it seems to me advisable to consider such cases as periodic ophthalmia, or at least very suspicious, where there does not exist direct evidence of some other condition. Even here you may be misled by a combination of circumstances and a faulty history.

I shall not go further into the discussion of symptoms or technic of examination at this time since we have arranged to demonstrate some of these conditions in the clinic following this discussion.

Method of Procedure

The immediate reason for presenting this subject at this time is that we are constantly receiving inquiries from veterinarians from all parts of this state concerning this disease and especially requesting our method of treatment. Since all of the known advocated methods of treatment have proved inefficient in our hands we have felt justified in experimenting with treatment in conjunction with our study of the disease and therefore have not felt free to answer these requests for fear of adding confusion to the situation. However, since we have been using a uniform method for the past fifteen months we have decided that we should give a brief report to the veterinarians of this state for the purpose of enlisting your aid in solving some of the problems confronting us concerning this disease.

Our work at the present time is being conducted cooperatively by the departments of Veterinary Surgery, Anatomy, and Research. The departments of Surgery and Anatomy are studying the clinical phases of the disease and making a comparative study of normal eyes, while the Research Department is making laboratory studies of tissue and fluids of both normal and diseased eyes.

In reviewing the literature upon this subject one finds many different opinions concerning the possible contributing causes,

but the concensus of opinion seems to favor an organism as the final factor in precipitating the disease. If this is true, I am convinced that, either some horses are naturally immune or that some have a natural or acquired predisposition for such attacks, which becomes manifest upon being subjected to proper contact with the organism. The latter supposition seems more plausible to me, since we all know that frequently only one eye of an individual becomes affected and when the eye sight is destroyed the attacks cease to recur.

However, acting upon the suggestion that the character of the disease favored protozoan origin, I decided to place the cart before the horse and try the use of arsenicals intravenously.

Technic of Administration

In using 4½ grams of neoarsphenamin (the amount we are regularly using now), we use about 30 cc of freshly distilled water. The neoarsphenamin is placed in the water which is gently agitated until the neoarsphenamin is completely dissolved and a clear, straw-colored solution is obtained. The material should not be agitated much, especially if exposed to air, on account of the possibility of rapid oxidation. For the same reason the material should be administered soon after it is prepared.

It is administered directly into the jugular vein with as little delay as possible. We find that there is no necessity for slow administration, nor for using more than 30 cc of water, and perhaps less could be used with safety.

I believe these two points are important since the liability of faulty technic in the administration is greatly reduced; by this I mean that there is less liability to inject some of the material into the wall of the vein or the surrounding tissue. Table I gives the date of treatment, age of the horse, kind of product and amount used on cases of periodic ophthalmia between the dates October, 1922, and June, 1923, and on which we have been able to obtain definite data during the first part of January, 1924.

Of these twelve animals treated, our reports for January, 1924, show that seven have not had a recurrence of an attack, three are blind in the affected eye but have had no noticeable recurrence of an attack in either eye, while in two cases the attacks continued to recur in the affected eyes, causing them to become blind or practically so.

TABLE I—*Data on twelve cases treated.*

CASE	TIME TREATED	AGE	AMOUNT (GMS.)	PRODUCT
1	October, 1922	12 yrs.	0.6	Salvarsan
2	January, 1923	5 yrs.	1.2	Salvarsan
3	March, 1923	Aged	0.6	Neoarsphenamin
	April, 1923		1.8	Neoarsphenamin
4	April, 1923	2 yrs.	2.7	Neoarsphenamin
5	April, 1923	2 yrs.	3.6	Neoarsphenamin
6	May, 1923	2 yrs.	5.5	Neoarsphenamin
7	May, 1923	Aged	1.8	Neoarsphenamin
8	May, 1923	6 yrs.	1.8	Neoarsphenamin
9	May, 1923	6 yrs.	1.8	Neoarsphenamin
10	June, 1923	10 yrs.	3.0	Neoarsphenamin
11	June, 1923	Aged	1.2	Neoarsphenamin
12	June, 1923	12 yrs.	1.2	Neoarsphenamin

The variation in the dosage was due to two factors: First, we did not know the proper dosage and, second, we had only a limited amount of material. The first two treatments consisted of Metz' salvarsan, furnished by our Research Department. Later, through the kindness of Dr. N. S. Mayo, of the Abbott Laboratories, we were on several occasions supplied with neoarsphenamin, for experimental purposes. Table II gives a brief summary of seven animals used as controls.

TABLE II—*Data on control animals*

CASE	TIME OF ATTACK	AGE	TREATMENT
1	Summer of 1921. Again in Jan., 1922	10 years	Hot packs to eyes; Lugol's solution in the supra-orbital fat
2	Left eye affected during summer and fall of 1921. Feb. 8, 1922, right eye affected	4 years	
3	Left eye affected, Jan. 23, 1922. Both eyes suffered subsequent attacks	4 years	
4	Both eyes affected during April, 1923	4 years	
5	Left eye, Dec., 1922. Right eye, Mar., 1923 Repeated attacks in both	7 months	No Treatment
6	Normal animal	1 year	
7	Normal animal	5 years	

The first five animals in this group are totally blind in one or both eyes today. The last two animals in this group have been

constantly exposed to the disease by the contact method for nine months, having been stabled in the same box stall with the two animals which received no treatment. They have never shown any sign of an attack.

In addition to this work I have tried to transmit the disease artificially in the following ways: First, by transfusing blood into normal individuals from a horse while affected with an acute attack of the disease. Second, by subcutaneous and intradermal injections of similar blood into normal horses. Third, by administering some of this blood per os to normal horses. Dr. Murray and his co-workers as well as other investigators have tried to transmit the disease by using the fluids of affected eyes. We have not been successful in transmitting the disease in a single case.

In talking with Sir Arnold Theiler upon this problem, he said, "Yes, keep on looking and you will find." He further stated that they had worked upon the disease during the presence of the British Army in South Africa and that in his opinion the reason their native horses did not become affected was the fact that the disease was due to an animal parasite, the intermediary host of which could not survive in their climate. If this should be true we must then try to determine the intermediary host as well as the immediate cause of the disease. We wish to emphasize the fact that it is not safe to draw any conclusions from such a limited report, but ask that you consider it as a confession to the veterinarians of this state of what we are attempting along this line.

In conclusion I should like to make a few suggestions and call your attention to some existing circumstances. I would suggest a state-wide study of the disease which could probably best be reported by counties. We should carefully study the condition of the soil, drainage, sanitary conditions and systems of management of the various sections and note their possible relation, if any, to the existence of the disease. We might also make note of the kind and extent of parasitic infestations, and we should carefully consider the influence of heredity, so that we can tabulate the concensus of opinion from actual records.

Our present state law, regulating the sale, transfer or public service of stallions and jacks, places the profession, breeder and dealer in a bad position. In the first place, the profession is too often in error due to the fact that the veterinarian does not know how or otherwise fails to apply a systematic, thorough

examination of the eyes. It is true that even a close examination of some eyes, which have been known to have had attacks, will not reveal the fact so far as our present knowledge of the pathology and clinical interpretation of the disease go. However, there is a possibility of making advances along that line and we already know that many eyes that appear normal from a superficial examination will prove defective upon close inspection. It is true also that often a breeder or dealer will shop until he finds a veterinarian who is not so exacting in his examination of the eyes, thereby getting a certificate and in some cases for a blind horse.

If horsemen in general believe that there is nothing to that part of the law referring to periodic ophthalmia, as the teaching and the practices of many breeders clearly indicate, then they should have the law repealed and cease searching for a state certificate of soundness, issued and obtained on a superficial examination by a careless or incompetent veterinarian, to hide behind for commercial purposes. On the other hand if we have or can have definite proof that heredity is an important factor in the production of this disease, then the law should become so rigid as to eliminate for breeding purposes both stallions and mares which have been affected with periodic ophthalmia. However, regardless of the weakness or advisability of such a law, so long as we are held responsible to any extent we should give a thorough and conscientious examination when called upon to do so and should not feel content under any circumstances until we have rendered such service as would justify the fee and minimize the chance for criticism It is with a view of furthering our knowledge of eye diseases and what constitutes a careful examination of the eye that we have arranged for a practical demonstration for all who are interested.

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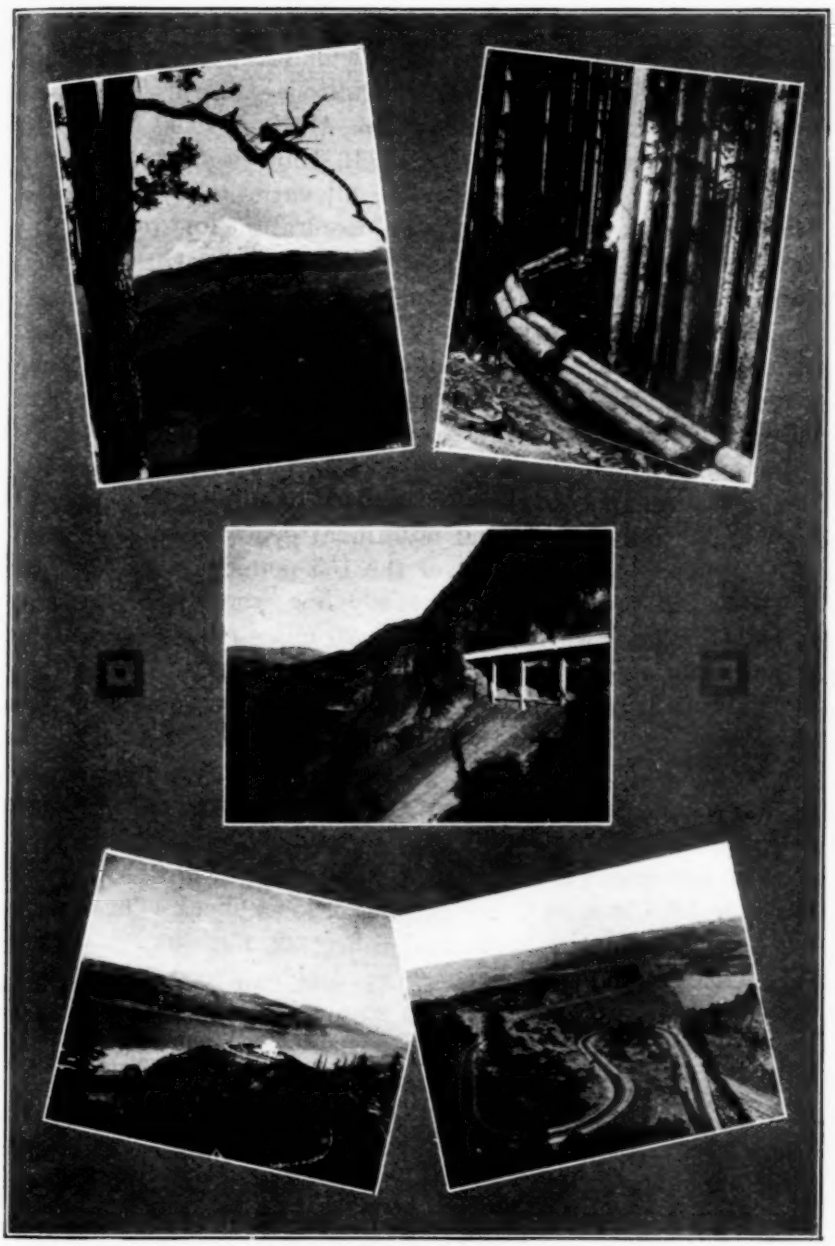

ON THE WAY TO PORTLAND

THE BOISE, IDAHO, ENDURANCE RIDE

By CAPT. W. R. KIDWELL, *V. C., 116th Cav. I. N. G.*
Boise, Idaho

Boise, Idaho, staged its first annual Endurance Ride the week of Sept. 14, 1924. It was held under the sponsorship of the Boise Chamber of Commerce, the Gymkahana Association, and the Adjutant General of the Idaho National Guard. The judges were Capt. L. R. Shaffer, 13th Cav., U. S. A.; Dr. H. E. McMillan, of Filer, Idaho; and Dr. W. R. Kidwell, of Boise, Idaho.

On Monday morning, Sept. 15, all entrants were weighed. The horses were weighed, and pulse, respiration, and temperature were recorded. Measurements were taken of the chest or heart girth and abdominal girth, in the region of the flank. A thorough physical examination was given each animal, special attention being given to any blemish, unsoundness, or abnormality. The gaits of the various mounts were observed, with riders up, and notes made while moved at a walk, trot, and canter.

Each horse had to carry 200 pounds weight, including the rider. If the rider weighed 155 pounds or more when stripped, he had to carry one pound additional dead weight for every two pounds of live weight over the 155 pounds.

The course was sixty miles; extending from Boise Barracks to Caldwell, a town located about 25 miles from Boise. Here all entrants stopped for the noon rest, fed and watered their mounts, and took on a light lunch themselves. They were checked in by the Route Master on arriving, and checked out again upon resuming the ride. From Caldwell, the route extended to Meridian, and thence into Boise. The requirements were that the horse must complete the sixty miles in not less than 9 hours nor more than 11 hours. This included any stops made to water, feed, rest, or to replace lost or loose shoes. The entrant had to ride the entire distance.

Sergt. George Gatlin, horse-shoer of Hdq. Troop, 116th Cav., I. N. G., carried his emergency equipment to reset or replace loose or lost shoes. He rode the entire distance each day, in a car, with one of the judges, and replaced shoes on the road only under the direction of a judge.

Each morning, the rider was weighed out with his full equipment, including saddle, bridle, blankets or pads, and any weights that he carried, and weighed in each night on completion of the

day's ride. An accurate record of all grain or forage fed was kept by the Route Master, Mr. L. M. Davidson, of Boise.

The first morning out, 27 entrants and aspirants started, including one woman. All finished the sixty miles in the prescribed time, though some came in quite lame. The second day, 22 entrants started, with one dropping out en route. The third day, 17 started, with two dropping out on the road. The fourth day, 11 started, with seven finishing; while, on the fifth and last day, 7 started, with two being eliminated on the road. The remaining five finished within the prescribed time, as hereinafter stated.

Each morning, the judges carefully examined each horse and observed them under the saddle, at a walk, trot, and canter, to note any lameness or weakness which might have developed during the night. If any were noted, the horse and rider were eliminated and not allowed to start the day's ride.

On the morning following the fifth and final day's ride, the judges met at the stables, and each horse was carefully examined before the owners or riders were permitted in, to care for their mounts. The pulse, temperature, and respiration were again recorded. The riders were then permitted to enter the stables and attend to their horses for a period of fifteen minutes. The horses were then weighed and measured, as on the preceding day of the ride, after which they were tried out with riders up, to determine the character of their gaits and to note any weakness. One horse was eliminated, as he was too lame to go on the road. The judges then retired to a private office, where all notes and records were carefully gone over to determine the winners.

The winning horse, No. 11, owned and ridden by A. F. Feamster, of Nampa, Idaho, was a three-quarter-bred saddle horse of "Red Squirrel" breeding. His time for the 300 miles was 47 hours and 44¾ minutes. This horse consumed 51¾ pounds of oats and 102 pounds of hay during the five days, and lost 15 pounds in weight. He gained ¾ inch in heart girth and lost 1¾ inches in the flanks.

The horse which was awarded second place was No. 20, owned and ridden by Earl Coleman, of Meridian, Idaho. This animal was a three-quarter Morgan horse. His time was 48 hours and 53 minutes. He consumed 49 pounds of oats and 92 pounds of hay; losing 20 pounds in weight in the five days. He also lost 1½ inches in heart girth and 3 inches in the flanks.

The horse which was placed third was No. 10, owned by the U. S. Government and assigned to Troop C, 116th Cav., I. N. G., at Grace, Idaho. He was ridden by Sergt. E. R. Cox of that troop. His total time was 48 hours and 32¾ minutes. He consumed 51½ pounds of oats and 105 pounds of hay. He lost 40 pounds in weight. His heart girth was 2 inches and his flank measurement 4 inches less than when he entered the race. This mount, while making slightly better time than the one placed second, did not finish in as good condition. He was continually troubled by interfering behind, which counted greatly against him. This rider also received a cash prize of $25.00 for showing the best horsemanship during the contest.

The fourth horse, No. 22, was owned by the U. S. Government and assigned to Service Troop, 116th Cav., I. N. G., at Caldwell, Idaho. He was ridden by R. J. Lonkey of that troop. His time was 49 hours and 23 minutes. This animal consumed 47½ pounds of oats and 100 pounds of hay. He lost 20 pounds in weight as well as 1 inch in heart girth and 1¾ inches in the flanks.

The fifth horse that finished, No. 6, was owned by the U. S. Government and assigned to Hdq. Troop, 116th Cav., I. N. G., at Boise, Idaho. He was ridden by the Commanding Officer of that troop, Capt. J. F. Coonan. His time was 48 hours and 27½ minutes, which was the second-best time made. This horse consumed 51½ pounds of oats and 113 pounds of hay, losing 40 pounds in weight. He gained ¾ inch in heart girth and lost ¾ inch in the flanks. While this horse was not placed within the money, he deserves favorable mention and praise. It was unfortunate that this animal did not place, because of his wonderful spirit and stamina which was shown throughout the ride. The spirit and horsemanship of his rider, who was untiring in his efforts to care for his mount, was no less conspicuous. It it is safe to say that Capt. Coonan gave more attention to his mount than any other rider while on the road. However, on the morning of the final judging, this horse could scarcely be moved from his stall, his left hind leg being so swollen and sensitive that it was with difficulty that he was moved at all. This condition, of course, eliminated both the horse and rider. Suffice to say that Capt. Coonan was given the consolation prize which was subscribed by his friends and admirers.

In conclusion, will say that the ride was a success from every angle, especially so when one considers (1) that this was Boise's

first attempt at staging an affair of this nature, and (2) that no horses were permanently injured or died as a result of this grueling contest. It demonstrated that blood and breeding counts when it comes to endurance. Also, one might be led to believe that the environment and climatic conditions of Idaho, under which these horses lived, are conducive to producing the highest quality of stamina and staying power, which is so much desired in horses of this type. From the interest and enthusiasm shown, the indications are that there will be more and better-blooded horses entered for the 1925 Ride than there were last year.

MEAT CONSUMPTION GAINING

Meat-eating is increasing in the United States, according to the Department of Agriculture's statistics for 1924.

Animals slaughtered during the year totaled 79,432,614—about 1,000,000 above the 1923 mark.

Cattle, calves and sheep each increased by 500,000 while swine decreased by the same amount. The figures cover the animals killed under the federal meat-inspection service.

During last December a record was set for hog-killing, the total slaughter being 6,600,306, which is 700,000 greater than any previous month.

ON THE WAY TO PORTLAND

Hunting Scene, near Roseburg, Douglas County, Oregon.
Roseburg is 200 miles south of Portland.

MEASLES IN DOGS DUE TO CYSTICERCUS CELLULOSAE

By BENJAMIN SCHWARTZ

Zoological Division, Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C.

In a collection of parasites recently received from Major E. Houdemer, of the Ecole Vétérinaire at Hanoi, Tonkin, Indo-China, there were included several bladderworms from a dog, tentatively determined by the sender as *Cysticercus cellulosae*. A detailed study of one of these specimens showed that the diagnosis of *Cysticercus cellulosae* is correct, the worms conforming morphologically to the description of that parasite from the pig. The material in question consists of three free bladderworms and of one specimen embedded in muscle tissue. The bladderworms are from 8 mm. to 9 mm. long by 5 mm. wide. The rostellum of the specimen which was examined microscopically is 500 μ wide and the suckers are from 270 μ to 280 μ in diameter. There are thirty hooks, arranged in a double row, the large hooks alternating with the small hooks. The latter are from 105 μ to 114 μ long, and the large hooks are from 151 μ to 156 μ long.

Although *Cysticercus cellulosae* is normally parasitic in swine, it is known to occur in a rather large variety of mammalian hosts, including dogs, the number of clinical cases on record from the latter host probably not exceeding thirty so far as can be judged from published summaries. Railliet[5] states that about twenty cases of *Cysticercus cellulosae* in dogs are on record, and Cremona[1] summarizes twenty-two cases and adds a new case, but his summary is incomplete, as he lists only those cases in which the parasites occurred in the brain. Five cases mentioned by Neumann[3] are not included in Cremona's summary. According to Neumann[3] and to Vosgien,[6] *Cysticercus cellulosae* has been encountered not only in the brain and body musculature of dogs, but also in other locations, notably in the liver, pancreas, kidneys, lungs, heart, peritoneum and intestine.

The symptoms accompanying cysticercosis in dogs are varied, depending largely upon the site of the infection. According to Neumann[3] the presence of *Cysticercus cellulosae* in dogs, in regions other than the nerve centers, is not accompanied by symptoms.

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In cases in which the parasites are located in the brain, however, pronounced symptoms have been observed by various writers, including fever, vertigo, epilepsy, delirium, convulsions, prostration, and in some cases the infection led to a fatal termination.

Attempts to produce measles in dogs experimentally by feeding them hexacanth embryos of *Taenia solium* were unsuccessful so far as concerns the experiments of Railliet[4] and those of Leuckart.[2] Neumann[3] on the other hand succeeded in producing experimental measles in one of four dogs to which he fed the embryos of *Taenia solium*, the positive dog showing an infection in the brain as well as in the muscles.

So far as can be judged from the number of cases on record *Cysticercus cellulosae* is a rare parasite of dogs. The views expressed by Neumann,[3] which are shared by Vosgien,[6] that the number of cases of *Cysticercus cellulosae* in dogs would increase greatly if the flesh of these animals were examined as rigorously for evidence of measles as is the flesh of hogs, are not borne out, as will be presently shown, by the meat inspection statistics of Germany, where thousands of dogs are slaughtered annually for human consumption. The fact that by far the large majority of the published clinical cases on record refer to the localization of the parasites in the brain is significant, however, and probably indicates that only pronounced clinical cases of cysticercosis in dogs are apt to be discovered by veterinary practitioners, cases in which the parasites are absent from the brain escaping detection because of the probable absence of marked symptoms.

The occurrence of *Cysticercus cellulosae* in dogs is of considerable hygienic significance in countries where dog meat is used as food by man. In Germany, for instance, the meat inspection regulations take cognizance of the possible occurrence of measles in dogs and provide for the destruction of dog carcasses found to be infested with *Cysticercus cellulosae*. According to statistics published by the German Government,[7] 6,340 dogs were slaughtered in a period of three months in the year 1923 (3rd quarter), which represents an increase of nearly one hundred per cent over the number of dogs slaughtered in a similar period in 1922. Despite the large number of dog carcasses that are subjected to inspection, comparatively few cases of measles have been discovered in dogs in Germany, the statistics for Saxony[8] for the period from 1905 to 1920, both inclusive, revealing but five cases of *Cysticercus cellulosae* in dogs in thousands of animals examined, ranging from over one thousand to over three thousand dog

carcasses per year. Despite the apparent scarcity of *Cysticercus cellulosae* in dogs, this source of tapeworm infection for man must not be overlooked in Germany and in other European countries as well as in less civilized parts of the world where dog meat is used as human food.

SUMMARY

A case of *Cysticercus cellulosae* in a dog, in which the parasites occur in the muscles, is reported, the material originating in Tonkin, Indo-China. Previously published cases of measles in dogs are based largely on the localization of the parasites in the brain.

Aside from the fact that measles in dogs may prove to be a serious condition in these animals, the importance of *Cysticercus cellulosae* in dogs as a possible source of infection of man with the dangerous pork tapeworm should not be overlooked.

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ILLINOIS STATE VETERINARY MEDICAL ASSOCIATION

The summer meeting of the Illinois State Veterinary Medical Association will be held in Peoria, July 8-9. The local veterinarians, making up the Committee on Arrangements, have plans for entertainment well in hand. There will be a banquet the evening of the first day under the big spreading trees in Peoria's most beautiful park. The banquet will be followed by a dance. These features are only a part of the entertainment being planned. Not a single Illinois veterinarian can afford to miss what promises to be the greatest summer meeting ever held in the history of the Association. Members are urged to bring their families with them. A special committee will be charged with looking after the comforts of the visiting veterinarians and their families, and they are promised the time of their lives.

SOME VETERINARY REMINISCENCES

IX. Cuba

By N. S. Mayo, *Chicago, Ill.*

If you have never been dropped down in a foreign country where you did not know a word of the language, you have no idea how helpless one feels. I would have given most of my worldly goods (they were few but precious) to have been able to speak Spanish, but there was no *camino real* (royal road) to the goal, so one had to "sail in" and mangle and murder the beautiful Castilian language in the usual barbarous American manner. One incident will illustrate. Mrs. Mayo wanted some eggs. I looked the word up in a dictionary and started for the store. When I got there, I asked for Thursdays instead of eggs, the names having a somewhat similar sound. The grocer insisted that he did not have them, but I knew he did. After many vain efforts by sounds, I made a picture of an egg, and got a round biscuit—then I made a picture of a *hen* and *got my eggs*.

One of the first things to be done was to make a survey of the live stock conditions of Cuba, and determine the needs of the live stock industry and do what was possible to assist in its development. It must be remembered that this was soon after the Spanish-American War, and Cuba was just beginning to recover from this and also the disastrous effects of the Cuban revolution. The live stock industry had practically been destroyed—as one stockman said—"If one party couldn't eat all my cattle, they killed them to prevent the other side from eating them." Cattle to restock the country were being imported from the Southern United States, Honduras, Columbia, Venezuela, and Puerto Rico. Cuba is a "ticky" country, and it was necessary to secure animals that were immune to tick or Texas fever. The Cuban breeders had tried many times to improve their herds by importing pure-bred animals from the Northern United States and Europe, but they said such cattle "always got sad and died."

In going to a foreign country, one is likely to measure everything by the standards of your native land, and sometimes these are very different. The first time I went to Camaguey, I found a Texas cattleman selling imported "coast cattle" to the Cubans.

On watching a Cuban picking out some cows, I was unable to understand what points he considered in making his selection, and I was familiar with the cattle industry of the Southwest, so I asked through an interpreter, and the Cuban replied, "The horns, the hair, and the tail." To me this was an entirely new method of selection, and the Cuban explained that he was picking cows with short hair "because the cattle ticks ate the long-haired cows alive." He was picking cows with big horns because he sold his bulls for working oxen, and as they yoke oxen by the horns, it was important that the horns be large, and the Cuban also thought that a cow with a long, slender tail walked faster and her calves therefore made better oxen.

I took to Cuba, for the Government, some pure-bred animals, among them some Berkshire swine. The Cubans looked them over. "Holy Virgin Mary! What wonderful hogs!" and then they asked, "Will the sow fight off wild dogs and protect her pigs?" I meekly confessed I did not think she would. In some parts of Cuba, native dogs, that were formerly used to hunt slaves, run wild in the woods, and will devour young pigs unless the older hogs fight them off. Later, I imported some Tamworths, and when these were crossed on the native razor-backs, the offspring would fight anything that came along. A native always picked a tree convenient to climb before he went near them.

A survey of Cuba from a veterinary standpoint indicated that anthrax was common, particularly among working oxen and during the cane-grinding season. When an ox became sick and lagged in the team, the driver used his goad freely on the sick ox and then on others, with disastrous results. Thorough vaccination against anthrax, of all working oxen before the grinding season started, greatly reduced anthrax losses.

In Cuba, as in most tropical regions, parasites, both external and internal, cause great damage to the live stock industry. The most important parasite was the cattle tick, not only because it hampered the importation of pure-bred cattle, but because of the loss due to gross infestation. The Cubans were using an extract of sabadilla to wash their grossly infested cattle. It is the most powerful "tickicide" I know, but is expensive. After much experimental work with various tick dips, particularly the South African and Australian arsenical dips, a simple method of making an inexpensive and efficient arsenical tick dip was introduced in April, 1907. I consider this my most important

contribution to veterinary medicine. At this period, the U. S. Bureau of Animal Industry was using Beaumont crude oil, but a year or two later, they changed my formula slightly and made it the Bureau official dip. Dr. Ransom, in one of his publications, did give me credit for its development. Other parasitic diseases that were new to me were liver flukes, lung worms, and screw-fly infestation. There were also other parasites, "too numerous to mention."

In 1906, while I was Acting Director of the Experiment Station, a revolution occurred in Cuba, and the Agricultural Station was the camping place for various bands of rebels. It was a great experience to be mixed up with a real Latin-American revolution. While the rebels took a number of horses, we saved the best and also the other pure-bred stock. The rebels treated us very considerately, and we did our best to be fair to all. When the American Army of Intervention landed, the revolution ended, and on behalf of the American Army, I received the arms given up by a rebel brigade that was encamped in the Station grounds. The rebel general commanding sent me a letter of thanks for the courtesies extended to his brigade, and gave me his campaign machete as a souvenir. Later, the Secretary of Agriculture of the Cuban Government also sent me a letter of thanks for the manner in which the government property had been cared for.

Just previous to the outbreak of the revolution, I had been offered and had accepted the position of Vice-Dean of the National Veterinary School at Montevideo, Uruguay, where the late Dr. D. E. Salmon went as Dean. Some difficulty occurred between the Rector of the University of Montevideo and the President of Uruguay, and as the American Army officials wished me to stay in Cuba, I withdrew my acceptance.

In 1909, an anti-American administration took office in Cuba, and most of the Americans employed in the Cuban Government service were asked to resign to make places for the party politicians. It was with mingled feelings of joy and sadness that we left "The Pearl of the Antilles," where we spent five pleasant and interesting years; left the many Cuban friends we had learned to love so well, for our own home land. As the outward-bound steamer plowed the sapphire waters of the Gulf Stream, and the beautiful headland of Mariel, crowned with graceful royal palms, grew dim from haze or tears, the words of Gilbert came to mind:

"Then go away if you have to go,
Then go away if you will,
To again return you will always yearn
While the lamp is burning still.
You have drunk the Chagres water
And the mango eaten free,
And, strange though it seems, 'twill haunt your dreams,
The land of the cocoanut tree."

Portland—July 21-22-23-24—Plan To Go!

ON THE WAY TO PORTLAND

Hart Lake on side of Mt. Rainier. 5600 feet elevation.

EXCERPTS FROM LITERATURE ON BAYER 205

By HUGO HARTNACK, *New York, N. Y.*

It is probably generally known that Bayer 205 is a specific for trypanosome (flagellate) diseases of man and animals. Bayer 205 has attracted the attention of not only the scientific world, but also the general public, on account of the very important role which it is expected to play in the economic development of those countries which can hardly be considered habitable at the present time on account of trypanosome diseases. In the different peace treaties after the War, it played an interesting role as well. The following collective abstracts of literature may therefore be of special interest to veterinarians, although there is at present no field for the application of this remedy to the control of infectious diseases in the United States.

Naganol (Bayer 205 *pro usu vet.*) is a fine, reddish powder, easily soluble in water.

Germanin (Bayer 205 *pro usu humano*) has a white color and is a little more refined than naganol. Neither contains arsenic or quicksilver.

UEBER BISHER BEI DER BEHANDLUNG DER DOURINE MIT BAYER 205 GEMACHTE ERFAHRUNGEN (Concerning results already obtained with Bayer 205 in the treatment of dourine). W. Pfeiler. Mitteilungen der Tierseuchenstelle der Thüringischen Landesanstalt für Viehversicherung, 1920, (5).

Pfeiler had occasion to use Bayer 205 in the treatment of horses affected with dourine, a disease brought to Germany during the War. Pfeiler gave intravenous doses totalling 25 grammes, over a period of eight days, and in all cases obtained complete recovery. By complete recovery he means the removal of all clinical symptoms. Pfeiler observed severe pododermatitis (laminitis) after the treatment, but this was always completely cured in from ten days to three weeks.

CHEMOTHERAPEUTISCHE VERSUCHE MIT BAYER 205 BEI BESCHAELSEUCHE (Chemotherapeutic experiments with Bayer 205 in dourine). Dr. H. Miesner and Dr. R. Berge. Deut. Tierarzt. Woch., xxix (1921).

Bayer 205 *in vitro* has no bactericidal effect. *In vitro*, 1 per cent solutions kill *Trypanosoma equiperdum* in two hours. The trypanosomes disappear from the blood of a mouse treated with Bayer 205 in twelve hours. The fatal dose for mice is 0.01-0.02 gm. After treatment with Bayer 205 it was not possible to infect mice within thirty days. Mice treated simultaneously with 0.005 gramme of Bayer 205 and trypanosomes remained healthy. Mice, guinea pigs and horses infected with trypanosomes and treated later with Bayer 205 were rid of the trypanosomes in twelve to forty-eight hours. It was possible to infect a cured horse two months after the treatment with Bayer 205. Cured mice could not be infected after two and one-half months. The author never saw relapse in all the different animals treated with Bayer 205.

VERSUCHE ZUR BEHANDLUNG DER DOURINE MIT BAYER 205 IN DER PRAXIS (Practical experiments in the treatment of dourine with Bayer 205). Dr. Führer and Dr. Pfeiler. Mitteilungen der Tierseuchenstelle der Thüringischen Landesanstalt für Viehversicherung, 1921, (11-12), 1922, (1).

Dosage: Large doses in the beginning. The first day, 4-5 grammes; the second day, 5-6 grammes. If laminitis (always a danger with large doses) does not occur, 6-7 grammes after a week.

PROPHYLAXE BEI DOURINE (Prophylaxis in dourine). W. Pfeiler. Mitteilungen der Tierseuchenstelle der Thüringischen Landesanstalt für Viehversicherung, 1922. (2).

With a prophylactic dosage of 6 grammes of Bayer 205, the infection with trypanosomes can be prevented for 180 to 200 days.

DIE TRYPANOZIDE WIRKUNG VON BAYER 205 AUF TRYPANOSOMA EQUIPERDUM (The trypanosomicide effect of Bayer 205 on *Trypanosoma Equiperdum*). Kurt Hesselbach. Centralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten, lxxxix (1922).

The trypanocidal effect of Bayer 205 on *Trypanosoma equiperdum* is described particularly; also the changes of the trypanosomes under the influence of Bayer 205 *in vitro* and in the animal body.

KASUISTISCHE MITTLEILUNGEN UBER EIN ANSCHEINENDES VERSAGEN DER BAYER 205—BEHANDLUNG BEI AN NATUERLICHER BESCHALSEUCHE LEIDENDEN PFERDEN (Some cases in which Bayer 205 seems to have failed in the treatment of horses suffering from natural dourine). Dr. W. Pfeiler. Centralblatt für Bakteriologie, Parasitenkunde, Infektionskrankheiten, lxxxviii (1922).

Pfeiler describes a few cases in which Bayer 205 seems to have failed in the field treatment of dourine. The worst of these cases have been treated by only one veterinarian. Also, in the others, the treatment does not seem to have been conducted in the prescribed manner.

UBER DIE WIRKUNGWEISE VON BAYER 205 BEI DER EXPERIMENTELLEN TRYPANOSOMENINFEKTION DER MAUS (Concerning the action of Bayer 205 in experimental trypanosome infection of mice). J. Morgenroth and R. Freund. Klinische Woch., iii, (2).

Bayer-205-treated mice remained permanently cured when the trypanosomes had disappeared from the blood, even though the animals were originally infected with one of the most malignant kinds of nagana cultures, a type which usually causes relapses. In the mouse, the trypanosomes disappeared, at the latest, the second day after the treatment. The theory of the combination of Bayer 205 with antimonium tartaratum is a new theoretical principle in medicine, very useful in combatting trypanosomes which are resistant to Bayer 205.

MODE D'ACTION DU "BAYER 205" SUR DIVERS HEMATOZOAIRES: TRYPANOSOMES, PIROPLASMES, THEILERIES, ANAPLASMES

(The action of Bayer 205 on various hematozoaires: Trypanosomes, Piroplasmes, Theileries, Anaplasmes). E. Brumpt and G. Lavier. Bull. de la Soc. de Path. Exotique, xv (1922), 2.

The experiments of the authors have proved conclusively that Bayer 205 is a specific which kills trypanosomes (*Trypanosoma Brucei, Trypanosoma rhodesiense, Trypanosoma venezuelense*), but that it is not effective in killing piroplasmas, as *Theileiria mutans, Piroplasma canis*, or anaplasma of cattle.

RICHTLINIEN FUR DIE ANWENDUNG VON BAYER 205 BEI TRYPANOSOMENKRANKHEITEN (Directions for the use of Bayer 205 in trypanosome diseases). Dr. Martin Mayer. Arch. fur Schiffs und Tropen-Hygiene, xxvi (1922), pp. 33-37.

As the result of his treatment of many hundreds of animals with Bayer 205, and his eighteen years' experience with trypanosome diseases, the author gives dosage, application, by-effects, checking of the effect, prophylaxis, etc. As Bayer 205 remains in the blood many months, it is better to give it at longer intervals than in only two or three consecutive injections. This cumulative effect, which makes possible a prophylactic treatment, is one of the reasons why Bayer 205 is far superior to other trypanosomicides.

BERICHT UEBER DIE PRUEFUNG VON BAYER 205 IN AFRIKA (Report on the testing of Bayer 205 in Africa). F. K. Kleine and W. Fischer. Deut. Medizinische Woch., 1922, (51).

This refers to the trypanosome of sleeping sickness of man and tsetse-sickness of cattle. Toward the end of their development in the insect's body, they enter the salivary glands and thereby are inoculated into the blood of man and animals. Bayer 205 is effective in controlling this kind of trypanosomes. The intensity of its effects varies according to the virulence of the trypanosomes, and the kind of animal. Because the remedy is ejected from the body gradually, its effect lasts a long time.

VIRULENZANDERUNG DES TRYPANOSOMA EQUINUM NACH BEHANDLUNG MIT BAYER 205) (Change in virulence of *Trypanosoma equinum* after treatment with Bayer 205.) Fritz Schmidt. Arch. für Schiffs und Tropen-Hygiene, xxviii (1924), pp. 397-403.

Schmidt did not succeed in making dogs and horses resistant to Bayer 205. Trypanosomes which were submitted to the effect of Bayer 205 were weakened in their vitality and virulence, and it was easy to affect them with Bayer 205.

DIE BEHANDLUNG DER SURRA MIT BAYER 205 (The treatment of surra with Bayer 205). Dr. G. Baermann. Arch. für Schiffsund Tropen-Hygiene, xxvi (1922), (2).

Experiments with numerous horses and buffaloes, to determine the effect of Bayer 205 in surra, showed good and very promising results. Baermann, nevertheless, says that a definite conclusion cannot yet be reached.

BEHANDLUNG DES "MAL DE CADERAS" DER PFERDE MIT DEM NEUEN MITTEL, BAYER 205 (Treatment of mal de caderas of horses with the new remedy, Bayer 205). Dr. L. E. Migone, Asuncion (Paraguay), and Dr. T. Osuna. Arch. für Schiffsund Tropen-Hygiene, xxvi (1922), pp. 289-304.

No satisfactory results were obtained in experiments during many years in the treatment of mal de caderas with alcohol, potassium permanganate, extractum filicis, quinin salts, methyl blue, trypan red, arsenous acid, arsenic compounds, arsenophenylglycin, atoxyl, arrhenal, 606, 914, etc., antimony tartrate, protosan. Only partial results were derived from the use of urotropin and helmitol, but recurrences ensued. As a result of the authors' treatment of 326 horses with Bayer 205, they claim that Bayer 205 opens new horizons to the development of cattle-breeding in South America and that, with the therapeutic and prophylactic properties of Bayer 205, it is possible to control mal de caderas in South America.

STATISTICAL RECORD OF THE EFFECTS OF THE TREATMENT OF HUMAN SLEEPING SICKNESS WITH BAYER 205. Luc. Fontana. Arch. Med. Belges, 1924, (4), p. 271.

Bayer 205 seems to be no more effective on trypanosomes than atoxyl or tryparsamide. The chief advantage is its long-extended disinfectant effect on the blood (average 226 days; minimum 145 days), which is important from the epidemiological point of view.

UBER DIE HEILUNG DES BŒSARTIGEN KATARRHALFIEBERS DES RINDES MIT BAYER 205 (The cure of malignant catarrh of cattle with Bayer 205). Dr. Ellinger. Berl. Tierärzt. Woch., 1921, (41).

In the treatment of malignant catarrh of cattle, Bayer 205 is better than any other remedy. It is more effective when applied in the beginning of the disease than later. (The number of cases treated is not reported.)

TWELFTH INTERNATIONAL CONGRESS OF AGRICULTURE

The Twelfth International Congress of Agriculture will be held in Warsaw, Poland, June 21-24, 1925. As has been the custom in preceding years, the 1925 Congress will be organized under the auspices of the International Commission of Agriculture. The Congress will be composed of official delegates from the various governments, as well as delegates sent by public institutions and organizations allied with agriculture in those countries which are represented in the International Commission of Agriculture.

The Warsaw Congress will deal with a limited number of questions of paramount importance. Among the topics to be discussed will be animal production, including breeding and feeding. Under this head will be discussed the value of the different types of horses used in the Great War. Another important subject to be discussed is a better understanding of methods for controlling animal diseases from an international standpoint.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

PARALYSIS OF THE RADIAL NERVE

By OSCAR GLUECK

Lederle Antitoxin Laboratories, Pearl River, N. Y.

A twelve-year-old horse, used for the production of human antistreptococcic serum, stumbled and fell in the paddock during exercise. He was unable to rise, and it required the assistance of four men to help him to his feet and lead him back to the stable, where he was placed in a sling. During rest, the right foreleg was held in a flexed position, the anterior wall of the toe touching the ground. On moving, the shoulder and the elbow joint of the affected leg were held in extension, the other joints in flexion; at the same time the anterior wall of the hoof touching the ground. The horse was unable to move his leg farther than a line drawn perpendicularly from shoulder joint to the ground in front of the foot.

By placing the foot in a proper position, the horse supported his weight on the same but, on the slightest movement, he knuckled over, being unable to place any weight on the leg.

In testing the sensibility of the leg by pricking the skin with a needle, it was possible to detect, on the lateral surface, under the elbow joint, a long elliptical-shaped area of insensibility. The treatment consisted in the administration of one grain of strychnin sulphate subcutaneously, on three consecutive days. Then an interval of three days and a repetition of the same treatment. Likewise, massage to the affected leg; the horse being kept continuously in a sling. After twelve days of this treatment, the horse was able to use the affected leg during light exercise.

In an attempt to back the horse from the stall, the animal suddenly fell, following which the symptoms in the affected leg were manifested in a more aggravated form. Therefore, it was decided to destroy the animal. The autopsy revealed a parenchymatous degeneration of the anconeus and triceps muscles.

HANDLING DIFFICULT BREEDERS

By E. C. HARTER, *Portland, Ore.*

Having never read or talked with anyone who had observed anything in veterinary literature pertaining to impregnation of cows in some of the obstinate cases where breeding was difficult, I pass this along for what it may be worth.

I have had a few years' experience in a dairy practice and there fell to my lot the usual amount of hard breeders. In these cases where the only abnormality is cervicitis or catarrhal exudate at the os and where the menstrual period is regular, it may be assumed, from the history and examination, to be purely a case of cervicitis.

I have douched repeatedly and about the only result obtained was the pleasant sensation of flowing water. After all attempts had seemed futile I fell upon this method: When the cow is in heat, douche the vagina with two quarts of normal saline solution, then let the bull serve her, after which immediately withdraw the semen in a syringe, pass a small, fiber catheter through the cervix and inject the spermatazoa directly into the uterus, keeping the syringe and contents at a body temperature while placing the catheter.

My reason for this is that the catarrhal exudate is too heavy and tenacious and cannot be entirely removed. Thus it prevents the wiggling of the spermatazoa anteriorly and, consequently, they are discharged without conception.

In twelve cases, out of nineteen consecutive breedings from five different bulls, I have had twelve deliveries of calves. The thirteenth was manipulated by another veterinarian, but she has passed three heat periods, so I feel optimistic. If she matures it makes one hundred per cent.

Let us hear from some one else.

RETENTION OF URINE DUE TO PSYCHIC (?) EXCITEMENT IN A HORSE

By OSCAR GLUECK

Lederle Antitoxin Laboratories, Pearl River, N. Y.

A nine-year-old gelding, used in the production of tetanus antitoxin, showed, on January 24, 1925, slight colicky pains, lying down frequently, the penis protruding and straining without effective micturition. Other symptoms were inappetence,

rhythmic but strong pulse, feces normal and well formed. The temperature was 100.4° F.

The rectal exploration revealed a distended urinary bladder. On pressure of the bladder, the animal manifested pain, groaned, stood with arched back, but, notwithstanding the pressure applied to the bladder, no urine was passed.

By introducing a catheter into the bladder, the animal passed 800 cc of urine, which was dark in color. As further treatment, massage was applied to the bladder through the rectum, together with enemas of lukewarm water. Following this treatment, the animal appeared quiet and passed urine in a normal way.

Diagnosis: Mechanical obstruction, such as stricture, urinary calculi, or enlarged prostate, was excluded as being the cause of this unusual condition, due to the fact that by introducing the catheter no resistance was met. The quick recovery and the absence of other nervous symptoms precluded paralysis of the bladder.

The condition very strongly suggested a spasm of the sphincter muscle of the neck of the bladder, due to psychic excitement brought about by the large injections of tetanus toxin. During the injection, this particular animal showed unusual nervousness and great fear, manifested by trembling and whinnying.

TUBERCULOSIS OF THE UDDER

Among the many interesting clinical cases observed in systematic tuberculosis eradication, one of the most striking occurred recently in a Utah herd, tested by Dr. C. L. Jones, Federal veterinarian stationed at Provo, Utah. He applied the intradermic test to the ten cattle in the herd and obtained one reactor. This was a 5-year-old, grade Guernsey cow showing no physical symptoms, but the test revealed a characteristic reaction at the point of injection.

On postmortem examination the cow showed well-marked lesions of tuberculosis in one quarter of the udder. Lesions were found nowhere else in the body. The infected quarter and teat appeared normal externally, and when cut into, as shown in figure 1, four tuberculous nodules adjacent to the milk duct were plainly visible. The pointer shows one of the largest. The dark spots on the cut surface of the teat are small clots of blood.

In discussing the case, which is one of the most striking of its kind, Doctor Jones expressed the opinion that the presence of

tubercle bacilli in the milk of the cow was extremely probable, if not inevitable, judging from the close proximity of the lesions to the milk duct. It was the natural channel into which discharges of the bacilli would drain, especially during manipulation of the udder and teat in milking.

The milk of the cow had been mixed with that of the rest of the herd and sold raw, locally, as well as being used by the

FIG. 1. Teat cut obliquely, disclosing tuberculous lesions. The arrow points to one of the largest, close to the milk duct, and into which discharges naturally drained. The owner had noticed that the teat was sore but is remained for the tuberculin test and a trained veterinarian to diagnose and detect the disease.

owner. His family, however, consisted only of adults. The test was the first one made of his cattle. The owner is a progressive dairyman and a believer in the tuberculin test. The detection and removal of the cow was gratifying to him, though the indemnity he received was less than one-half the cost of replacing

the animal. He had noticed that the cow had a sore teat, but believed it was due to a minor injury, not suspecting tuberculosis.

This case shows the value of the tuberculin test in removing sources of infection of milk supplies and in freeing the healthy cattle in the herd and locality from the menace of a diseased animal. The source of infection is not definitely known, but the germs probably entered through a scratch or abrasion of the organ affected. The sanitary conditions in the locality are unusually bad during the winter months, which shows also the great importance of sanitary measures in keeping tuberculosis out of a healthy herd, to say nothing of preventing its spread in one containing diseased or untested cattle.

(U. S. Dept. of Agriculture.)

A WORD OF WARNING

By L. H. Smith, *Mt. Clemens, Mich.*

A veterinarian should not treat, for any disordered condition of the reproductive organs, a cow that has been recently purchased, unless the consent of the seller has been obtained, particularly if the cow is a valuable registered animal. In the Holstein-Friesian Association there is a sort of gentlemen's agreement to the effect that the purchaser of a cow has six months in which to breed her before he can return her to the seller for failure to breed. If a veterinarian is called in during this six-months period, he should be sure that the purchaser has obtained the consent of the seller to have the cow treated. If this is not done, and the veterinarian goes ahead and treats the animal, which later turns out to be a non-breeder, the seller may reserve the right to refuse to take the animal back.

The name of the Michigan Agricultural College has been changed to the Michigan State College of Agriculture and Applied Science, through legislative enactment.

In honor of the sixtieth birthday of Dr. Max Cremer, professor of physiology in the veterinary institute of the University of Berlin, a special number of the Biochemische Zeitschrift has been dedicated to him. The University of Cologne has conferred on Dr. Cremer the honorary degree of doctor of laws.

(*Science.*)

REVIEWS

FIRST AID TO ANIMALS. John Lynn Leonard, D. V. M. Veterinarian, Department of Health, New York City. First edition. 396 pages, with 37 figures in the text. Harper and Brothers, New York, 1924. Cloth, $2.50.

The author freely acknowledges that he has not written a book for veterinarians, but entirely for the layman who loves animals. The material covers a very large field and a surprisingly large amount of useful information has been crowded into the 27 chapters comprising the volume. The author tells how to approach animals, gives directions for rendering first aid to animals, both large and small, as well as poultry. In the chapter entitled, "Diseases of Animals Communicable to Man," the author discusses rabies. If every owner of a dog could read this chapter and absorb the information and advice given therein, it could be said that the author and publishers have really rendered a very valuable service. The only criticism that might be made of the treatment of this important subject is the the difference between purely prophylactic vaccination against rabies and the antirabic treatment applied following a bite is not brought out with sufficient clearness for the layman to understand. The book is more comprehensive than the title would indicate and it might be asked why, in a book on first aid, the author discusses such subjects as cataract in dogs, heaves in horses, mange in cattle, gapes in poultry, and some others.

AN INQUIRY INTO THE CAUSE OF THE INCREASE OF TUBERCULOSIS IN SWINE. L. Van Es and H. M. Martin. Univ. of Nebr. Agr. Exp. Sta. Res. Bul. 30, Feb. 1925.

For some time veterinarians have been aware of the fact that the time was at hand when they would have to change their views on the relationship of porcine tuberculosis to the disease in other species. For a long time it was believed that the eradication of bovine tuberculosis would automatically put an end to a large part of the disease in swine. This assumption has been found to be false. In certain areas, practically free of bovine tuberculosis, the hogs continue to show lesions of the disease. According to the authors, the number of retentions of swine on account of tuberculosis, as shown by data published in the 1922

Yearbook of the U. S. Department of Agriculture, rose from 13.83 per thousand, in 1907, to 163.87 per thousand, in 1922.

The bulletin gives detailed data on the investigations, which the authors have summarized as follows:

1. The type of swine tuberculosis which is responsible for the increased retentions of carcasses and the condemnation of parts is for the greater part due to infection of avian origin.
2. In the eradication and control of swine tuberculosis success can only then be attained when the two chief fountain heads of infection, namely, the tuberculous cattle herd and the tuberculous poultry flock be regarded as equally important.
3. There are indications that the steady increase in the incidence of swine tuberculosis as shown by abattoir statistics reflects a similar increase in the spread of avian tuberculosis in a large area of the United States.
4. In the intradermal tuberculin test of swine in which a mammalian tuberculin is used a considerable number of cases of tuberculosis will escape detection. For dependable results avian tuberculin must also be used.
5. In the bacteriologic diagnosis of tuberculosis of swine by animal inoculation tests, the results will, for a large proportion of the cases, remain inconclusive when only cavias are used for the purpose. In the case of swine, at least, some laboratory animals susceptible to avian tuberculosis also or susceptible to both avian and mammalian tuberculosis should be included in the experiment.

ABSTRACTS

INTERESTING CASES OF FOOD POISONING. Frank J. Monaghan. Weekly Bul., Dept. of Health, New York City, xiii (1924), 40.

All the children of a family, comprised of father, mother and six children varying in age from 5½ to 19 years, showed symptoms of food infection as characterized by acute onset of vomiting, cramps, diarrhea of varying severity, fever and prostration. The father and mother were not affected.

It was found that the meals eaten prior to infection comprised similar items except that the children had eaten canned pork and beans twenty-four hours before the onset of symptoms while the father and mother had not.

Cultures from the cans which had contained the infected food were made with the result that *B. suipestifer* was isolated from the remaining contents of one can but not from the other. This organism was recovered from the stools of the six affected children but not from those of the parents who were unaffected. The blood of the children gave positive agglutination reactions with *B. suipestifer* while the blood of the parents did not.

The conclusion seemed justified that pork from an infected hog had been used in the preparation of the pork and beans.

Although it is difficult to understand how, in the processing of this food, one can could escape heating to the center, at least to a temperature sufficient to kill the organism in question, it was found that the bacilli isolated were killed in five minutes at 145° F. No source of outside contamination was found. The contents of the can were heated before serving.

The case is of interest on account of the great difficulty in determining the exact source of the infection and also because *B. suipestifer*, a secondary invader in hog cholera and a member of the paratyphoid group, should cause food infection in man.

S. S.

UNILATERAL KASTRATION AV KUER (Unilateral Spaying of Cows). Norsk Veterinaer-Tidsskrift, Oslo, ix (1924), pp. 272-273. Abst. from Schweizer Archiv fur Tierheilkunde, Feb. 1923.

Siepel (original author) reports 33 cases of unilateral spaying of cows. The cows suffered with nymphomania and unilateral cyst formation in the ovaries. The following symptoms were observed: Tearing up the soil with the horns, (observed in 29 out of 33 cases examined). This symptom, according to the author, is more marked in unilateral than in bilateral cyst formation of the ovaries, as it causes greater discomfort when only one ovary is affected. The broad pelvic (sacro-sciatic) ligament on the affected side was relaxed, pronounced in 28 of the 33 cases. On the healthy side no such changes were noted. He considers the relaxation of this ligament to be due to reflex action from the diseased ovary. No marked changes in the vagina or neck of the uterus. Occasional changes, such as reddening of mucous membrane and more abundant secretions than usual, were dependent on a chronic congestion in connection with permanent estrum.

The uterus and horns are normal. However, if the disease lasts for a considerable length of time a non-infectious metritis may be demonstrated. Hypertrophy of a horn of the uterus in connection with ovarian affections is always found on the side of the diseased ovary. In unilateral affections cystic degeneration of the ovary is the condition at hand. The author expressed the opinion that the cysts, which cause nymphomania, are primary cysts that etiologically bear a certain relation to a very active udder function. Unilateral cysts are generally deeply imbedded in the ovarian tissue, while bilateral cysts are located more super-

ficially. One can find graafian follicles besides the cysts, but in cases in which the cystic degeneration causes nymphomania one never finds any corpora lutea. The milk may be bitter and is generally rich in albumin and low in fats.

Treatment: Spaying is the best treatment, preferable to massage, squeezing or puncture. Massage or compression of deep cysts usually brings no results and the irritation brought on by the manipulations may cause disturbances in the other ovary through reflex action. After spaying fifteen "bullers," Seidel noted the following results: The nymphomania disappeared. The broad pelvic (sacro-sciatic) ligament regained normal tension. If the other ovary became affected the corresponding sacro-sciatic ligament relaxed. If one ovary becomes diseased no follicles are formed in the other one, but on removal of the diseased ovary it becomes active again. It seems that the number of heifer calves exceeds that of bull calves born by unilaterally spayed cows.

H. J. S.

GJEDDEPESTEN I 1923 (The Pike Plague in 1923). C. S. Aaser. Norsk Veterinaer-Tidsskrift, i (1925), pp. 1-14. (To be cont.)

First a brief review is given of the general field of fish diseases, followed by a brief introductory description of this disease of the pike (*Esox lucius*, Lin.): "The pike plague which appeared in this country (Norway) in 1923 was characterized by large ulcers and defects on the head as well as on the body of the affected animals. Especially were the head, both jaws and cheeks affected. The ailment evidently ran a rapid course with a very considerable mortality and seemed essentially to affect large pike. People commonly designated the disease as "gjeddepest" (pike plague), "spedalskhet" (leprosy), "gjeddesyke" (pike sickness), "spanskesyke" (Spanish flu) etc.

In general the disease resembled greatly the disease, "Hechtkrankheit," described in Germany and Austria. For this reason the author submits a rather complete review of the literature published on this disease. This is followed by a detailed account of the appearance of the disease in Norway, description of symptoms, cause and gross pathology. Report on bacteriological investigations to appear later.

H. J. S.

ARMY VETERINARY SERVICE

CHANGES RELATIVE TO VETERINARY OFFICERS

Regular Army

First Lieutenant Herbert K. Moore, V. C., on duty at Fort Sheridan, Illinois, promoted to grade of Captain on April 2, 1925.

Captain Wm. H. Houston, V. C., is relieved from duty as assistant to Attending Veterinarian, Washington, D. C., on or about May 10, 1925, and directed to report to the Commanding Officer, Reno Q. M. I. D., Fort Reno, Oklahoma, for duty.

Captain Horace S. Eakins, V. C., is relieved from duty at Fort Myer, Virginia, effective in time to sail from New York City August 6, 1925, for Panama Canal for duty in that Department.

First Lieutenant Raymond T. Seymour, V. C., is assigned to duty at Fort Hoyle, Maryland, on completion of his present tour of foreign service about August 31, 1925.

Captain Burlin C. Bridges, V. C., is relieved from duty at the Purchasing & Breeding Headquarters, Fort Reno, Oklahoma, and will report for duty at Fort Bliss, on or about May 10, 1925.

Veterinary Reserve Corps

Additional Reserve Officers

Majors:
- Barber, Oliver Anson.....Route No. 1, Jacksonville, Ark.
- Pilgrim, Stanley Lefeber....190 Cedar Street, Wauwatosa, Wisconsin.

Captains:
- Kearns, Floyd Morton.....1880 Frankfort Ave., Louisville, Kentucky.
- McCormack, Walter Douglas.Conway, South Carolina.

First Lieutenants:
- Port, Walter Green.....Paullina, Iowa.

Second Lieutenants:
- Echavarria, Marciano.....San Fernando, Pampanga, P. I.
- Graves, Hobson Wm.....Box 66, Union, South Carolina.
- Mooberry, Clive Watson....144 Oneida St., Milwaukee, Wis.
- Pleuger, Carl August.....Cor. Dayton & Freeman Sts., Cincinnati, Ohio.
- Shahan, Maurice Sommer....447 North 2nd Street, Grand Junction, Colorado.
- Snyder, Jesse Beers.....4130 Flora Avenue, Kansas City, Mo.
- Stephenson, Henry George...P. O. Vox 348, Independence, Kans.
- Swanson, Raymond Victor...R. F. D. No. 1, Pocatello, Idaho.
- Wilkins, Harold Leslie.....114 West Cypress St., Anaheim, Calif.

Promotions

Ash, James Joseph, 5640 Justine Street, Chicago, Illinois, promoted to grade of Major, Vet-Res.

Marsh, Hadleigh, Live Stock San. Board, Helena, Mont., promoted to grade of Major, Vet-Res.

ARMY VETERINARIANS LICENSED FEDERAL HAY INSPECTORS

Arrangements have been completed whereby the U. S. Department of Agriculture issues a Federal Hay Inspector's license to veterinary officers who complete the prescribed course in hay inspection being given at the Bureau of Agricultural Economics

in connection with the Army Veterinary School. Fifteen officers from the last two classes of the School assigned to stations where they will be required to inspect hay offered for sale to the Army have completed the course and received their licenses.

This issuance of licenses to veterinary officers is of great importance to the Army Veterinary Service since it officially recognizes these officers as competent scientific hay inspectors.

By specifying standard U. S. grades in forage contracts and a proper interpretation of the specifications upon delivery of the product, the Army is assured of receiving the class and grade of forage for which payment is made.

BUREAU TRANSFERS

Dr. Charles A. Hulbush (McK. '08), from South St. Paul, Minn., to Spokane, Wash., on meat inspection.

Dr. Calvin S. Evans (Chi. '03), from Charleston, W. Va., to Raleigh, N. C., on tuberculosis eradication.

Dr. J. Eldoras Bard (O. S. U. '04), from Chicago, Ill., to Los Angeles, Calif., on meat inspection.

Dr. I. W. Eichelberger (Ind. '12), from Indianapolis, Ind., to Los Angeles, Calif., on meat inspection.

Dr. Laroy Noyes (K. S. A. C. '18), from Oklahoma, Okla., to Lincoln, Nebr., on tuberculosis eradication.

Dr. Carl C. Perry, from Chicago, Ill., to Salt Lake City, Utah, on tuberculosis eradication.

Dr. H. N. Guilfoyle (U. S. C. V. S. '07), from Harrisburg, Pa., to Hartford, Conn., on tuberculosis eradication.

Dr. Hugh F. J. Arundel (Cin. '19), from Chicago, Ill., to Cincinnati, Ohio, on meat inspection.

Dr. Steven P. Regan (Corn. '15), from Chicago, Ill., to Albany, N. Y., on tuberculosis eradication.

Dr. A. C. Farmer (O. S. U. '11), from Boston, Mass., to Harrisburg, Pa., on tuberculosis eradication.

PERSONALS

Dr. E. L. Volgenau (Amer. '93) was a recent Forum speaker at the N. Y. State Veterinary College, at Cornell. He spoke on "Practice in the Large Cities."

Dr. N. S. Mayo (Chi. '89), Manager of the Veterinary Department of The Abbott Laboratories, started for Mexico City, on a business trip, the latter part of May.

Dr. M. De Booy (Chi. '17), formerly of Hospers, Iowa, is looking after the practice of Dr. John L. Tyler, at Huntington Park, Calif., while the latter takes a well-earned rest.

Dr. John L. Tyler (Chi. '89), of Huntington Park, Calif., has given up practice for the summer and is taking things easy at Whittier, Calif. He expects to be at Portland.

Dr. C. M. Haring (Corn. '04), who has been in Europe for about a year, will return to the University of California this month. He wrote that he expected to call on the Editor about June 1.

COMMUNICATION

APPROVES EDITORIAL

To the Editor:

Allow me to congratulate you on the editorial in the April issue of the Journal. You have the present veterinary situation well "sized up" and your recommendations for relief are logical.

I hear many veterinarians lament that their clients will not pay more for their services. In such case it is up to the man to make the service worth more.

I believe the inroads on practice made by the extension of state medicine are our most serious menace and the efficiency of organized medicine, dominated, as it always will be by politics, in an emergency, was well demonstrated the past year in this state in the effort to control foot-and-mouth disease.

The practitioner should be protected and encouraged or much live stock will be lost for want of available men in emergency cases and routine practice.

W. E. Frink.

Los Angeles, Calif., April 6, 1925.

Portland—July 21-22-23-24—Plan To Go!

CUBAN NATIONAL VETERINARY ASSOCIATION

Through the kindness of Dr. Bernardo Crespo, editor of *Agricultura y Zootecnia*, Havana, Cuba, the Cuban National Veterinary Association has established an official section in this excellent monthly journal. This section is in charge of Dr. Angel Iduate, president, Dr. Francisco Etchegoyan, managing editor, and Dr. Estanislao Hermoso, secretary.

The first number contains a salutation and outline of the proposed program. There is also a report of a stock show held at the Cuban Agricultural Experiment Station, as well as a report of a meeting of the Cuban National Veterinary Association that was devoted to military veterinary practice. This session was in charge of Lieutenant Colonels Beltran and Cagigal, of the Cuban Army.

We congratulate the national association of our sister republic on their splendid progress and wish them the best of success.

N. S. M.

COMMENCEMENT

ONTARIO VETERINARY COLLEGE

The spring examinations of the Ontario Veterinary College, Guelph, Ontario, were completed on April 30, and graduation exercises were held the following day.

The degree of Bachelor of Veterinary Science was conferred at a special Convocation of the University of Toronto on fifteen graduates as follows: G. Cairns, G. A. Edge, O. Hinton, P. J. Kelly, F. N. Marcellus, F. MacLean, J. O. McCoy, J. E. Patterson, P. Priestley, W. J. Rumney, A. D. Spooner, H. E. Standen, R. P. Swartz, W. J. Turnbull, W. R. Wastrack.

Honors were awarded to members of the graduating class, as follows:

General Proficiency

First prize—Garth A. Edge, of Guelph, Ont.

Second prize—Patrick J. Kelly, of Osgoode, Ont.

Third prize—F. N. Marcellus, of Guelph, Ont.

Honorable mention—W. R. Wastrack, of Princeton, Wis.; R. P. Swartz, of Los Angeles, Calif.; W. J. Rumney, of Victoria Harbour, Ont.; J. E. Patterson, of Detroit, Mich.; F. MacLean, of Guelph, Ont.; J. O. McCoy, of Success, Sask.

Bacteriology

F. N. Marcellus, of Guelph, Ont.

The Helen Duncan McGilvray Honorarium

W. J. Rumney, of Victoria Harbour, Ont.

Canadian Army Veterinary Corps Honorarium

F. MacLean, of Guelph, Ont.

AUSTRALIANS PUBLISH JOURNAL

Number one of volume one of *The Journal of the Australian Veterinary Association* made its appearance under date of March, 1925. This publication will be on a quarterly basis and is the official organ of the Australian Veterinary Association. It is published at 56 Bridge Street, Sydney, Australia. Mr. M. Henry is editor, assisted by a committee composed of Messrs. J. D. Stewart, I. Clunies Ross and R. M. C. Gunn. Mr. Ross is business manager.

AMERICAN VETERINARY MEDICAL ASSOCIATION

Address of Welcome

By MRS. N. E. KENDALL

(*Delivered before the Women's Auxiliary of the A. V. M. A., Des Moines, Iowa, August 21, 1925.*)

I am greatly honored by the opportunity afforded me as the wife of the governor of Iowa, of extending to you the hospitality of the Capitol City of our State. But I also come in a more personal relation, because of my high regard for the profession you represent, either as surgeons and doctors, or as the wives of the medical men who are doing so much for our dumb animals. I yield to no one in the love I cherish for these faithful friends of ours. Possibly the principal service rendered by the veterinarian is the alleviation of pain on the farm and in the barn, and yet we who have household pets also owe a debt of gratitude to you and yours for the gentle and considerate treatment bestowed upon our loved and devoted favorites in sickness or injury.

I have a little fox terrier that my husband brought home in his pocket one summer evening, seven years ago. At that time he was about six weeks old—and about six inches long, but he was all "pep," from the point of his nose to the tip of his tail. What a tremendous joy he has been throughout the intervening time! He always assumes the attitude of our sole defender against all alien intruders. His clear, sharp bark and his keen sense of hearing always respond to the slightest sound from any foreign footstep. Our Paddywhack is:

A little demon in defense,
Brave as a lion he,
I wish I had the courage
Of this atom on my knee.

A little lump of loyalty,
No power could turn from me,
I wish I had a heart as true
From fear and favor free.

A little flash of fire and light
Whate'er the summons be,
I wish that I could face the world
With half his energy.

Just a little fox terrier
In whose brown eyes I see
The windows of a faithful soul
Too large to live in me.

But this little Paddywhack of mine has been inclined to roam as Paddies often do. In our neighborhood dwell two dogs of pedigree long—an English Bull and a Scotch Collie. Because of their blue blood and ancient lineage, they resent my Paddy's inherent desire for a place in the sun, in that parliament of dogs—the broad highway. As a sad consequence he often returns to me with his royal head "bloody but unbowed." Then it becomes my painful duty to carry this little pal of mine back of the fighting lines to some hospital unit where a humane veterinarian understands my aching heart and Paddy's throbbing wounds, and applies reassuring words of hope and healing salve to the lacerations of both of us.

Rudyard Kipling, who understood human nature so well, whether he wrote of "Soldiers Three," or sounded a warning in a "Professional Hymn," also understood us who love our dogs when he so fittingly said:

There is sorrow enough in the natural way
From men and women to fill our day,
And when we are certain of sorrow in store
Why do we always arrange for more?

Brothers and sisters, I bid you beware
Of giving your heart to a dog to tear.

When the fourteen years which nature permits
Are closing in asthma, or tumor, or fits,
And the vet's unspoken prescription runs
To lethal chamber or loaded gun,
Then you will find—it's your own affair—
But—you've given your heart to a dog to tear.

And so did we feel, some two years ago, when we had to send for the "vet," gently and quietly to give our old "Judge" his last long sleep, for he, too, had lived more than the fourteen years of allotted dog life, and the infirmities of advanced age were more than he could endure. This dear, loving, faithful old soul, we were told

Wagged his tail to the very last
And smiled in his last long sleep,
The troubles of life for him are past
In his grave a few feet deep.
His soul—for I feel he had a soul,
And he thought real thoughts I know—
Has found the ultimate end, life's goal,
In that heaven where good dogs go.

He has lived with me and has suffered with me
Shed tears in his dog-like way,
He has placed his paw at times on my knee
In a vain attempt to say:
"God never gave us that wondrous power
To tell all the things we feel,
But I want to say in my canine way
That my sympathy is real.

So I loved my dog to the very end,
And he in our daily walk
Was never just dog, but a constant friend
And we had no need to talk.
And I hope when the summons comes for me
To embark on the unknown tide
I shall find his eyes in the Paradise
They say is the Other Side.

So this is my reason for feeling so keenly about all animals, and why I am so profoundly convinced that nothing in all the medical profession can be more pleasing to our Heavenly Father than administering to the smallest of these, our faithful and silent friends.

And so again I bid you a most hearty welcome to the great State where "the tall corn grows."

ASSOCIATION MEETINGS

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular monthly meeting of the Veterinary Medical Association of New York City was called to order by the president, Dr. Bruce Blair, in the Academy of Medicine, 17 W. 43rd St., New York City, Jan. 7, 1925, at 8:30 p. m.

The minutes of the December meeting were read and approved.

Prof. Edward Lodholz, of the University of Pennsylvania, was the speaker of the evening and gave a most interesting and instructive talk on "The Physiology of Pain in the Domestic Animals." Among the important points brought out were that the sensation of pain was due to over-stimulation of nerves. That pain in animals was not so great as in man, also not so great in the primitive as in the present generation. He also showed that pain varied considerably in different animals.

President-elect Blair gave a splendid address, urging that a more general participation in the meeting be taken by the members. He asked each member to try to bring in a new member. He was in sympathy with the idea of holding clinics in the various institutions, to stimulate interest in the Association. He appointed the following committees for the ensuing year: Legislative, Drs. Ray W. Gannett, Robert S. MacKellar, C. E. Clayton; Program, Drs. J. E. Crawford, R. J. C. Garbutt, Wm. H. Lowe; Membership, Drs. O. E. McKim, Harry Ticehurst, Geo. W. Meyer; Prosecuting, Drs. E. A. Durner, O. R. Scheuler, H. Kock.

Dr. W. Reid Blair spoke on the subject of pain in animals and brought out several interesting points. Dr. O. E. McKim reported the removal of milk teeth from a pup having convulsions and this seemed to relieve the pup at once. Dr. McKim also reported having operated on a dog for perineal hernia, but found a carcinoma of the prostate gland.

Dr. H. K. Miller reported a case of pyometra in a bitch. On operation he found one horn punctured and the abdomen full of pus. The operation was completed and after washing out the abdomen the animal recovered. Dr. Ray W. Gannett reported a toy poodle apparently suffering from choke. This dog would eat food and in about one-half minute it would vomit all the food.

One-twentieth grain of apomorphin was given and there were no further symptoms of choke and the dog recovered.

Col. Bert English, of Governors Island, was present and, in referring to Prof. Lodholz' remarks, brought out that in his belief, in the boys in battle under fire, the sensation of fear would change to joy, pleased at the thought of going into battle. He also referred to the use of a sharp knife in operations—the cutting is too quick to allow sensations of pain. Col. English gave a talk on the recent fire on Governors Island, destroying a number of animals. Capt. J. R. Sperry, of Governors Island, referred to elementary stable hygiene and physiology.

A vote of thanks was extended Prof. Lodholz for his contribution to the program.

The resignations of Drs. John J. Joy, William Hayes and J. J. Hayes were accepted with regrets. The resignation of Dr. Wm. J. McKinney, of Brooklyn, was accepted and he was later elected an honorary member.

The secretary read a letter from the American Humane Society, asking that this organization go on record as opposing dog cropping. After some discussion it was moved and seconded that the president appoint a committee to draft resolutions to be presented at the next meeting.

No further business appearing, the meeting adjourned.

C. G. ROHRER, *Secretary.*

ILLMO VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Illmo Veterinary Medical Association was held March 27, 1925, at Highland, Ill. President W. L. Boggy, of Breese, being absent, our vice-president, Dr. A. Darling, of St. Louis, officiated. The meeting was attended by over forty members and visitors. For a good many of them this was the first visit to the city of Highland; but the address of welcome by the mayor, Dr. A. A. Wick, was impressive enough to make any of them feel at home. Dr. H. B. Piatt, of St. Louis, responded.

Dr. H. R. Schwarze, of East St. Louis, speaking on hog diseases, advised against paying any attention to petechiae and small hemorrhagic areas when holding postmortems, as these lesions appear in nearly all congestive diseases, and are apt to be confusing. Protein stimulation is the treatment, either by serum, bacterins or any other way possible, to form the antibodies to

fight the germs. The value of real hot slop after vaccination was emphasized. Necrotic enteritis was described as a sequel or complication of some other disease. Dr. Schwarze recommended treatment with proflavin and acriflavin, equal parts. For a 100-pound hog give 30 cc of a 1-1000 solution, hypodermatically.

In the discussions, Dr. J. S. Koen stated that the three outstanding lesions in hog cholera are: first, peripheral congestion of lungs; second, the ecchymoses on the surfaces of the lungs; third, spleen infection.

Adjourned for dinner at 12:30 p. m. Menu of milk-fed chicken q. s., a Highland product. Excellent music, saxophone and piano, was enjoyed by all. The local editor, Mr. A. Spencer, a leader in agricultural and live stock pursuits, gave us an encouraging address of the future in store for the veterinary profession. An auto trip to the Holstein-Friesian cattle farm of Eugene Nagel was a part of the program.

Dr. Horace Bradley, of Clayton, Mo., gave a talk on dairy type cattle. Mr. Nagel, the proprietor, talked on how to run a cow through a milk test. He also gave us the formula of his mixed ground feed:

Wheat bran	200 pounds
Crushed corn (including cob)	200 pounds
Crushed oats	100 pounds
Cottonseed meal	25 pounds
Powdered charcoal	5 pounds

Upon returning to Dr. W. R. Michael's hospital, E. Lee Myers, M. D., of St. Louis, and Andrew Darling, small animal specialist, demonstrated the bronchoscope on a dog, using the same technic as in the human, rendering visible either the right or left bronchial tube, as far as the point where they subdivide into five or six small bronchioles. The same was shown in the esophagus. This showed the ability of the esophagus to envelope foreign bodies that the inexperienced operator often would miss. A post-mortem on a chicken was given by Dr. H. R. Schwarze, which revealed a tumor of the submaxillary space, possibly of tuberculous origin.

The program was continued at the meeting hall. Dr. E. L. Quitman gave a talk on small animal practice. He stated that a city of 25,000 will support a small animal specialist, while in a smaller town it can be made a source of considerable revenue, if a man qualifies. It is the cream of veterinary practice, in his opinion. Dr. Quitman then discussed the handling and restraint

of dogs. Differentiating between eczema and mange, Dr. Quitman stated that eczema gives off a mousy odor, while mange has a strong characteristic odor of its own. He advised the use of arecolin, not only as a teniacide, but also as a general vermifuge, in the following doses:

Two months old or less	1/16 grain.
Three months	1/8 grain.
Adult Boston—20 to 24 lbs.	3/4 grain.
German Police	1½ grains.
Airedale	1¼ grains.
Large Airedale	1½ grains.

Hall gives ½ grain as maximum dose. Give on an empty stomach; if more than one tablet, give in capsule form, never in solution.

The so-called fits in dogs, or "fright disease," may be of dietetic origin, or caused from hookworms or distemper. If from faulty food, give calcium phosphate, and feed them out of it. If from hookworms, found mostly in the South, give carbon tetrachlorid, 2¼ minims per pound body weight of dog. If from distemper, give sodium cacodylate. For a 3-months old pup give 5 grains; 7-months old pup, 7½ grains. For use internally in distemper: Fldext. echinacea, 3 ounces; Mistura Pectorole (Mulford), q. s., 1 pint. One to two drams at a dose every three hours. If diarrhea is associated, use Squibb's sulphocarbolate compound. Dr. Quitman prefers morphin to H. M. C. Chloral hydrate per rectum is not reliable. His A. C. E. mixture is: aromatic spirits of ammonia, 1 part; chloroform, 2 parts; either, 3 parts. This he uses on small, young dogs, while on large dogs he used pure chloroform (Squibb's) in original 1-ounce bottles. Sodium cacodylate is helpful in eczema.

For follicular mange in dogs: Daily rubs with castor oil, or a 10 per cent solution of formaldehyd, rubbed in with swab, daily for 10 days. For mange in cats: Sulphur and lard, one to four applications. For gastric spasmodic contractions (gastro-spasm), found most commonly in Bostons, use luminal sodium. In spaying a cat use the flank site. Cut the skin, then cut the muscle lower down by moving the skin down. There is no need to suture the muscle. Sometimes it is desirable to put one suture in the skin. If the incision is made straight through the skin and muscle, the wound will involute.

Speaking of the horse situation, Dr. J. T. Jenneman, of St. Louis, stated that many tractors sold to dealers are still on the

dealers' floors. There are between 25½ to 26 million horses in the United States, 375,000 tractors on farms and 17,000,000 working horses on farms. His advice to farmers is to raise only those horses which he needs for his own replacement. The cost of city deliveries per auto is more than that per horse, and the consumer pays this difference. A saddle mare is a good asset on a farm, and a boy learning to take care of a horse learns to keep himself fit for life. Horsemanship is a character builder.

D. J. J. Lintner, of Chicago, in charge of tuberculosis eradication for Illinois, stated that the success of the veterinarian depends largely on his attitude towards his client. Fifty thousand cattle are being tested a month in Illinois, together with avian testing. The public has lost its confidence in poultry as a food. Records show that poultry consumption has decreased. This confidence must be replaced by the veterinarians.

Dr. Lintner stated that we cannot depend entirely on tuberculin to eradicate tuberculosis. Sometimes an animal is taken on general appearance, even though it did not react. Fixed-rib respiration usually indicates a generalized case. Once a reactor, always a reactor, though an animal may pass later tests. In addition to the caudal fold, he also injects in vulva or anus. Any intradermic swelling larger than a match-head is a reaction. Do not place too much confidence in the ophthalmic test.

Dr. J. S. Koen spoke on the problems of the veterinary profession of Illinois, and on advertising. He stated that this could be done: first, through the mailing of cards from a central place, such as the Illinois Department of Agriculture, or the State University, offering free consultation by local veterinarians, on a list of diseases named on the cards; second, through pamphlet circulation; third, through radio broadcasting from Station WLS (Sears Roebuck & Co.) of a number of lectures by prominent men of the profession. This plan is to be worked further at the Illinois State Veterinary Medical Association meeting, at Peoria, July 8-9.

Eight new members were elected to membership. Waterloo was selected as the next meeting place. Election of officers for the ensuing year resulted as follows: President, Dr. A. A. Wick, Highland; vice-president, Dr. W. R. Michael, Highland; treasurer, Dr. L. J. Miller (re-elected), Waterloo; secretary, Dr. L. B. Michael (re-elected), Collinsville.

This closed the largest, best and most instructive meeting this Association has held.

L. B. MICHAELS, *Secretary.*

MAINE VETERINARY MEDICAL ASSOCIATION

The Maine Veterinary Medical Association was called to order by the president, Dr. E. E. Russell, of Farmington, at the Congress Square Hotel, Portland, April 8, 1925, at 8 p. m.

The minutes of the previous meeting were read and approved. Dr. C. F. Davis, of Rumford, suggested that the prices to be charged for testing of accredited herds by accredited veterinarians be discussed, and practically every member present took part in this duscussion. As Maine has a larger percentage of its cattle under supervision for tuberculosis eradication than any other state in the Union, area testing is the plan mostly used. It was finally moved, seconded and carried that the following tentative schedule of prices be endorsed: A charge of two calls, minimum of fifty cents per head, up to fifty head, tested in one area. From fifty to two hundred head, in one area, thirty-five cents per head.

Hon. H. M. Tucker, Chief, B. A. I., State Department of Agriculture, read a new state law just passed by the Legislature which gives him authority to quarantine an area for tuberculosis eradication, to comply with accredited area work. All cattle, including oxen, must be tested before being admitted to state fairs. Tampering with ear tags is prohibited by the new law.

Dr. H. W. Jakeman, of Boston, Mass., spoke briefly on the formation of a New England Veterinary Medical Association and suggested that Maine join in this movement; he also mentioned the importance of veterinarians studying poultry diseases more and advised all who could do so to attend the poultry disease meeting at Amherst, May 13-14, at which time leading specialists of national reputation on this subject will make addresses. It was moved and seconded that the chair appoint two members to cooperate with other veterinarians towards forming a New England Veterinary Medical Association. Drs. C. F. Davis and J. B. Reidy were appointed for this purpose.

Dr. E. A. Crossman, B. A. I. Inspector-in-charge, tuberculosis eradication work in Massachusetts, Rhode Island, and New Hampshire, gave an interesting talk on the progress of the work in his area, and especially mentioned the importance of the coming conference, June 16-17, at Providence, R. I. The Legislature expects to allow five hundred dollars for this meeting and the live stock breeders, together with the Rhode Island veterinarians, expect to spend a like amount on entertainment for visitors on

this occasion. Ladies will be given special trips to Newport and surrounding places of note.

Mr. Fred L. Sylvester, of Penley's Abattoir, Auburn, who was a visitor at the meeting, spoke of the value of boosting Maine and Maine products.

It was voted that the next meeting be held in Aroostook County, sometime in July; time and place left for secretary Neal to decide later, as it was thought some of the New Brunswick veterinarians might also attend such a meeting if held near the Canadian border.

J. B. REIDY, *Res. Sec. for Maine.*

CONESTOGA VETERINARY CLUB

The regular meeting of the Conestoga Veterinary Club was held at the Stevens House, Lancaster, Pa., April 8, 1925, with thirteen members present. Dr. Harry W. Barnard, of Lancaster, Pa., presided.

Dr. John W. Adams, Professor of Veterinary Surgery at the University of Pennsylvania, delivered a very interesting lecture on "Surgery of Cattle Genitalia," which was the sixth of a series being given by the University Extension School. Dr. Adams' address and the discussion which followed were greatly appreciated by those fortunate enough to be present.

HENRY S. WEBER, *Secretary.*

PENNSYLVANIA BUREAU OF ANIMAL INDUSTRY CONFERENCE

The Pennsylvania Bureau of Animal Industry held its annual conference at Lancaster, Pa., during the week of March 16, 1925. The approximate attendance was seventy-five, which represented the field, laboratory and administrative forces of the Bureau. The Federal representatives located in Pennsylvania on tuberculosis prevention and control work were present and participated in the conference. Dr. T. E. Munce, State Veterinarian and Director of the Bureau of Animal Industry, in opening the conference stated:

"The purpose of the conference is to discuss points pertaining to Bureau activities and to receive suggestions looking to the improvement of existing methods and policies. Every Bureau co-worker, whether in the field, laboratory or office, and regardless of the phase of work in which he is engaged, has problems

confronting him, also good ideas as to improving Bureau methods and policies. It is these things we want to hear about; and the best way to do so is through the medium of a general conference."

In formulating the program the Bureau purposely avoided formal papers and addresses. Each person present, at some time or other, either spoke voluntarily or was called upon to discuss various phases of the work and to make constructive criticism. In this way everybody in attendance actively participated, with the result that many excellent and helpful suggestions were offered that otherwise would not have materialized and, furthermore, all the men were encouraged to think for themselves and express their views.

One of the features of the week was a day spent at the Lancaster stock yards. These yards play a large part in the Bureau's operations, being among the largest east of Chicago, and many thousands of animals are handled through this point yearly. The morning was spent in a general survey of the yards, and the afternoon with practical demonstrations staged by the State Bureau Laboratory.

A feature of the Tuesday evening program was a mock trail on tuberculosis eradication work. The practicing veterinarians of Lancaster, York, Lebanon and Chester counties were present. The mock trial brought out some very interesting points, and everyone had a profitable, as well as an enjoyable time.

During the conference, an address was made by the Secretary of Agriculture, Honorable F. P. Willits, and the Deputy Secretary, J. M. McKee. Dr. J. A. Kiernan, Chief of Tuberculosis Eradication, Federal Bureau of Animal Industry, attended the meeting and told, in a most able manner, what was being accomplished in tuberculosis eradication throughout the United States.

Mr. M. S. McDowell, Director of Agriculture Extension, Pennsylvania State College, gave a most interesting talk, in which he expressed to the Bureau the appreciation of the State College Extension Service for their cooperation in all fields of the work. He stated how the two services were closely allied in work, and that *cooperation* was the basis of past progress and would be the basis of future progress.

The conference adjourned Friday evening, at which time the men departed for their homes in all parts of the State, better equipped to carry out their respective duties during the coming year, and to spread the feeling of fellowship which was so pronounced during the conference.

NORTHWESTERN INDIANA VETERINARY ASSOCIATION

The Northwestern Indiana Veterinary Association met at the Plymouth Hotel, Plymouth, Ind., March 12, 1925. Dr. R. C. Julien, state veterinarian, spoke on the subject of poultry diseases, paying particular attention to fowl pest, fowl cholera and tuberculosis. Dr. J. E. Gibson, B. A. I. inspector-in-charge, tuberculosis eradication in Indiana, discussed tuberculosis in cattle and chickens. Dr. T. W. Munce, of Pitman-Moore Company, spoke on swine diseases.

CENTRAL MISSOURI VETERINARY MEDICAL ASSOCIATION

The Central Missouri Veterinary Medical Association met at the Hildebrandt Hotel, Sedalia, Mo., March 21, 1925. Rabies was the main topic on the program. A resolution was adopted favoring muzzling and vaccination as the best means for controlling the disease. Officers were elected as follows: President, Dr. George F. Townsend, Sedalia; vice-president, Dr. J. B. Rand, Bunceton, secretary-treasurer, Dr. H. L. Mahnken, Marshall.

CENTRAL ILLINOIS VETERINARY MEDICAL ASSOCIATION

At a meeting of veterinarians of Macon and surrounding counties, at Decatur, Ill., April 8, 1925, the Central Illinois Veterinary Medical Association was organized.

Dr. E. C. Hughes, B. A. I., Chicago, Ill., addressed the meeting on the subject of tuberculosis eradication.

Officers were elected as follows: President, Dr. A. C. Etchison, Assumption; vice-president, Dr. W. J. Davis, Decatur; secretary-treasurer, Dr. R. J. Hinkle, Decatur.

FORD COUNTY VETERINARY ASSOCIATION

The Ford County (Ill.) Veterinary Association met at the office of Dr. N. L. McBride, at Gibson City, Ill., April 6, 1925. Veterinarians were present from quite a number of the surrounding towns. Dr. J. S. Koen, of Bloomington, Ill., was the principal speaker on the program.

NECROLOGY

E. G. STANIGAR

Dr. E. G. Stanigar, of Belize, British Honduras, died May 3, 1924, following an operation for appendicitis complicated with peritonitis. Dr. Stanigar was graduated from the Ontario Veterinary College, with the class of 1908. For a short time he practiced in Montego Bay, Jamaica, and later in Kingston, with the late Dr. Linton, and for a time in Linstead, his home. In 1922 he accepted a government appointment in British Honduras, which position he filled up to the time of his death.

JAMES W. FARRIS

Dr. James W. Farris, of East St. Louis, Ill., died April 19, 1925, after an illness dating back about a year. He was in his 33rd year. Dr. Farris was a graduate of the Indiana Veterinary College, class of 1913. His home was at Fairfield, Ill., but he had been located at the National Stock Yards for about seven years. He is survived by his father, one brother and one sister.

E. S. BOWMAN

Dr. E. S. Bowman, of Winnipeg, Manitoba, died April 16, 1925. He came from Bervie, Kincardineshire, Scotland, in 1906 and practiced in Gladstone, Manitoba, for five years. For the past fourteen years Dr. Bowman was in the employ of the Health Department of the city of Winnipeg. He was a graduate of the Royal College of Veterinary Surgeons.

HENRY G. NIEHAUS

Dr. Henry G. Niehaus, a registered non-graduate practitioner, of Huntingburg, Ind., died February 25, 1925, in his eightieth year. He was in active practice until about a year ago.

S. R. CROW

Dr. S. R. Crow, of Rossville, Ind., died January 16, 1925 following an illness of several weeks. He was in his 98th year.

BIRTHS

To Dr. and Mrs. A. H. Williams, of Williams, Iowa, a daughter, Marilyn, March 19, 1925.

To Dr. and Mrs. B. B. Binnall, of Pierson, Iowa, a daughter, Audrey Faucheon, May 4, 1925.

PERSONALS

Dr. E. L. Sidwell (K. C. V. C. '15) has removed from Jerseyville, Ill., to Hardin, Ill.

Dr. A. E. Hays (St. Jos. '18), formerly of Lanesboro, Iowa, is now at Lake City, Iowa.

Dr. C. B. McGrath (Iowa '23) has removed from Tekamah, Nebr., to Lexington, same state.

Dr. H. J. Wright recently located in Hamilton, Ohio, and will open a small animal hospital there.

Dr. C. J. Bryer (U. P. '23), of Linesville, Pa., is stationed at the Union Stock Yards, Lancaster, Pa.

Dr. DuBois Jenkins (Corn. '18) has changed locations, from Warwick, N. Y., to Cobleskill, N. Y.

Dr. E. Brainerd (McGill '93), of Memphis, Mo., has returned to Colorado Springs, Colo., for a time.

Dr. W. A. Anderson (K. C. V. C. '07), of Sleepy Eye, Minn., holds the position of dairy inspector for his city.

Dr. A. E. Cameron (Ont. '08) has been transferred from Lethbridge, Alberta, to Ottawa. Address: 74 Fourth Avenue.

Dr. W. W. Shartle (Ind. '09) has removed from Opelika, Ala., to Montgomery, Ala. Address: c/o Imperial Hotel.

Dr. E. A. Laird (Iowa '22), of Springfield, Ill., recently accompanied a consignment of 2200 mules shipped to Spain.

Dr. H. J. Hoffeins (K. C. V. C. '14), formerly of Alta, Iowa, is now with the Purity Serum Company, of Sioux City, Iowa.

Dr. R. E. Taylor (Cin. '16), who has been located at Lebanon, Ky., for several years, has removed to Asheville, N. C.

Dr. Roscoe C. Griffith (Ind. '23), formerly of Larchwood, Iowa, has removed to Firebaugh, Calif. Address: c/o Poso Farm.

Dr. H. L. Van Volkenberg (Corn. '18), who has been at St. Paul, Island Alaska, for some time, is back in Springville, N. Y.

Dr. C. W. McIntosh (Ont. '13) has been transferred from Toronto, to Ottawa, Ont., His new address is 28 Ossington Ave.

Dr. M. J. Kellam (Ont. '93), of Winnipeg, Man., sailed for Great Britain from Quebec on the steamship Canadian Victor, May 8.

Dr. N. D. Christie (Ont. '10), of Winnipeg, Man., sailed for Europe from Montreal on the steamship Manchester Regiment, May 7.

Dr. D. J. Meador (Corn. '11), who has been located at Auburn, Ala., for some time, has returned to Selma, Ala., and entered practice there.

Dr. W. L. Endsley (K. C. V. C. '10) has returned to San Antonio, Texas, from Houston, where he was stationed on foot-and-mouth disease work.

Dr. C. S. Chase (N. Y.-Amer. '06), of Bay Shore, N. Y., has been seriously ill with an attack of blood poisoning, following an infected wound of one hand.

Dr. W. R. Crisler, of Shelbyville, Ind., enjoys the distinction of being the youngest member on the roll of the Spanish War Veterans, Camp No. 77.

Dr. L. M. Heath (Ont. '21), formerly located at the Research Station, Hull, Quebec, is now located at the Veterinary Research Station, Lethbridge, Alta.

Dr. N. L. Larsen was recently re-elected Mayor of Petersburg, Nebr., for the third consecutive term. There were only four votes cast against him in the election.

Dr. Charles A. Pyle (K. S. A. C. '07), who has been located at Columbus, Kansas, for several years, is back in Manhattan, Kansas. Address: 222 South Sixth St.

Dr. J. A. McKitterick (K. S. A. C. '22), of Greenwood, Mo., is engaged in the breeding of pure-bred Herefords and stable horses, in conjunction with his practice.

Dr. F. M. Hayes (K. S. A. C. '08), who has been taking post-graduate work at the University of Pennsylvania, the past year, has returned to University Farm, Davis, Calif.

Dr. Orrin B. Webber (Corn. '12), of Rochester, N. Y., won second honors with his Irish setter, Champion Molly Law, at the National Dog Show held in Cincinnati, in April.

Dr. James F. Adee (K. S. A. C. '23), formerly of Stanberry, Mo., has gone to Topeka, Kans., to accept the position of City Milk and Meat Inspector, succeeding Dr. G. W. Hill.

Dr. R. E. Rebrassier (O. S. U. '14) recently received the degree of Master of Science from the Ohio State University. He has also been elected to membership in the Sigma Xi Fraternity.

Dr. R. W. Gannett (Corn. '05), of Brooklyn, N. Y., using as his topic, "Pointers for Practice," was a recent speaker at the Forum of the New York State Veterinary College at Cornell University.

Dr. M. H. Doller (Cin. '18), who has been acting in the capacity of Assistant State Veterinarian of Kentucky, for the past three years, resigned his position April 1, and has again located in Danville, Ky., for the practice of his profession.

Dr. Joseph Patt (K. C. V. C. '93), of Mobile, Ala., sailed for Europe on the steamer George Washington, May 16. He will visit the veterinary colleges in Germany, Austria, Hungary, Italy, Switzerland, France, Belgium and Holland.

Dr. A. C. Bolle, of Petersburg, Ill., Menard County Veterinarian, met with a peculiar accident recently. While leaning over to read the ear-tag on a cow, she threw up her head and one horn penetrated Dr. Bolle's lower lip with sufficient force to loosen several teeth. The wound required four stitches.